

AFWAL-TR-86-3017 Volume III



ADVANCED DURABILITY ANALYSIS

VOLUME III - FRACTOGRAPHIC TEST DATA

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FOREW JRD

This report was prepared by General Dynamics, Fort Worth Division under Phases 1 and 2 of the "Advanced Durability Analysis" program (Air Force Contract F33615-84-C-3208) for the Air Force Wright Aeronautical Laboratories (AFWAL/FIBEC). James L. Rudd was the Air Force Project Engineer and Dr. Jack W. Lincoln of ASD/ENFS was a technical advisor. Dr. S. D. Manning of the General Dynamics' Structures Technology Staff was the program manager and co-principal investigator along with Dr. J. N. Yang of United Analysis Incorporated (Springfield, VA).

All tests were performed in General Dynamics' Metallurgy Laboratory by R. O. Nay under the direction of R. L. Jones. D. E. Gordon was responsible for specimen acquisition. Fractographic evaluations were performed by D. E. Gordon, S. B. Kirschner and K. Koepsel. L. E. Brubaker coordinated the fractographic data acquired.

This report (Vol. III) contains test results, raw fractographic data, and strain survey data developed under the "Advanced Durability Analysis" program. Other volumes for this program are as follows:

- Volume I Analytical Methods (Tasks I, II, III)
- O Volume II Analytical Predictions, Test Results, and Analytical/Experimental Correlations (Tasks 1, III, IV, and V)
- o Volume IV Executive Summary



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SECTION I

INTRODUCTION

This report contains test and raw fractographic data acquired under the "Advanced Durability Analysis" program [1]. Applicable test results, fractography and strain survey data acquired by the General Dynamics Fort Worth Division under independent research are also presented [2,3].

The test matrix and specimen details for this program are described in Section II. Test setups, testing procedures and data acquisition details are described elsewhere [4-6]. Raw test and fractographic results are presented in this Volume (III) and the results are evaluated in Volume II [4].

The fractographic data presented in this report can be used to quantify the initial fatigue quality (IFQ) or equivalent initial flaw size distribution for clearance-fit fastener holes in 7475-T7351 aluminum. Other sources for IFQ data are available [e.g., 6-12].

SECTION II

TEST PROGRAM AND RESULTS

2.1 INTRODUCTION

The test matrix and specimen details for the Phase 1 and 2 test programs are described in this section. Test results are summarized. The raw fractographic data and strain survey results acquired are presented in applicable appendices.

2.2 PHASE 1 TEST PROGRAM

Objectives of the Phase 1 test program were:

- 1. Acquire fractographic data for multiple-hole dog-bone specimens and use the data to evaluate the statistical scaling concept for defining the initial fatigue quality of fastener holes.
- 2. Obtain data for evaluating the effects of specimen size on the equivalent initial flaw size distribution (EIFSD).
- 3. Acquire fractographic data for unflawed fastener holes and use the results to evaluate the advanced durability analysis methodology for both small (e.g., \leq 0.10") and large (e.g.,> 0.10") through-thethickness crack sizes.

The test matrix for the Phase 1 effort (Task 1) is shown in Table 1 and the specimen details are shown in Fig. 1. Details of the Test Setup and procedures are given in Volume II [4].

Thirty-one replicate dog-bone specimens (Fig. 1), with no intentional preflaws in the fastener holes, were fatigue tested to failure at room temperature in a lab air environment. Two different load spectra were used. Test results for the Phase l effort are summarized in Table 2, including the final crack sizes for each of the three holes per specimen. Fractographic results for the fighter and bomber load spectra are presented in Appendix A and B, respectively.

2.3 PHASE 2 TEST PROGRAM

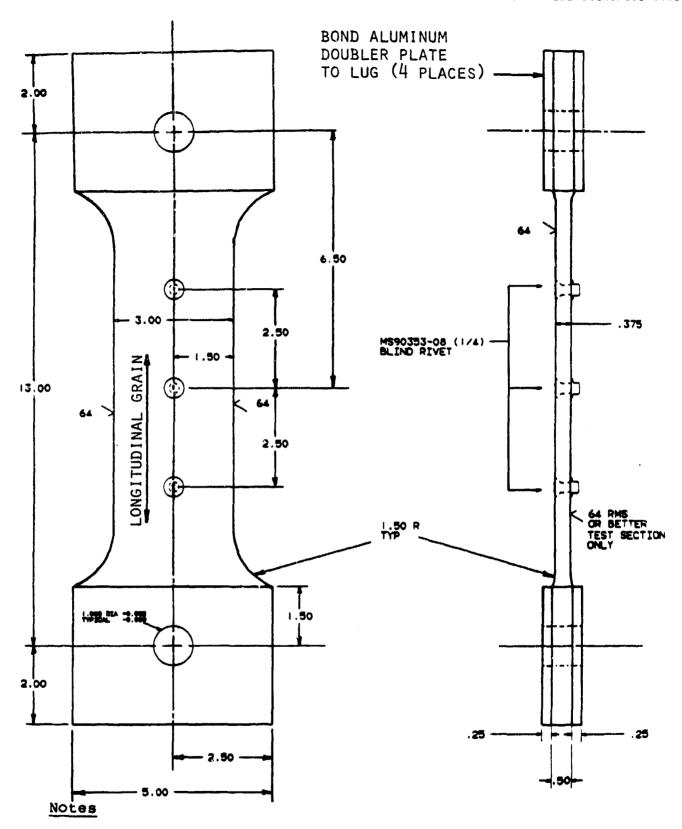
The Phase 2 test program had the following objectives:

- 1. Acquire fractographic results for large through-thethickness fatigue cracks in unflawed (no intentional preflaws introduced) fastener holes.
- 2. Obtain both small and large fatigue crack growth data that can be used to quantify the initial fatigue quality of fastener holes.

TABLE 1 PHASE 1 TEST MATRIX

NO. SPECIMEN	15	91
	68(1/4)	
FASTENER I.D.	MS90353-08(1/4)	
MAX. STRESS LEVEL (KSI)	34	36
соно spectra	F-16 400HR	B-1 BOMBER
% LOAD TRANSFER	6-	
NO. HOLES PER SPECIMEN	ε—	
TEST SERIES	I(a)	(9)I
MATERIAL	7475-17351 J	
SPECIMEN	0	. [0]

ALL TEST PEFORMED AT ROOM TEMPERATURE IN LAB AIR NOTE:



- 1. Material: 7475-T7351 aluminum plate (1/2" stock)
- Drill holes using modified Winslow Spacematic drill without deburring
- 3. Drill and install MS90353-08 rivets per M198.

Fig. 1 Multiple Hole Dog-Bone Specimen Details

TABLE 2 SUMMARY OF PHASE 1 TEST RESULTS

Notes for Table 2

- 1 Failed when disk drive was disconnected from computer system
- 2 Specimen bent in compression due to load cell malfunction
- 3 Hole with largest crack
- 4 Crack originated in countersink area
- 5 Maximum gross stress calibrated to maximum load in spectrum
- 6 Measured in direction of crack propagation with respect to bore of hole.
- 7 Lug end failure

- 3. Use the acquired data to verify the advanced durability methods developed for large through-the-thickness cracks associated with fuel leaks and ligament breakage.
- 4. Do a specimen strain survey using a double-reversed dog-bone type specimen and verify the percentage of bolt load transfer as a function of the applied load level.

The complete test matrix for the Phase 2 effort (Task IV) is shown in Table 3. Specimen details are shown in Figures 2 and 3. The test setups and procedures are documented in Volume II [4].

In Table 3 all fatigue tests were conducted at room temperature in a lab air environment. Three different load spectra were considered. Fatigue test results for Phase 2 (i.e., time-to-failure and final crack sizes in the fastener holes) are summarized in Tables 4-11 by test series. Fractographic results for test series IV(a) - IV(c), IV(h), IV(d) - IV(g) are presented in Appendices C through J, respectively.

Eight dog-bone specimens (Fig. 2) were fatigue tested and fractographically evaluated under General Dynamics, Fort Worth Division independent research [2]. Test specimens were made from the same batch of material used for this program. Four specimens each were fatigue tested the same way as test series IV(a) and (b) (see Table 3). Test and fractographic results for these tests are also included in Appendix C and D. These results and those for Test Series IV(a) and (b) are used in the durability analysis methodology evaluation in Volume II [4].

A strain survey was performed using a double-reversed dog-bone specimen (Fig. 3). Details of the strain survey and results are given in Appendix K. A more comprehensive strain survey has been performed using a replicate test specimen from the same material batch [3]. These strain survey results are also presented in Appendix K. The strain survey results presented in this Volume (III) are evaluated in Volume II [4].

TABLE 3 PHASE 2 TEST MATRIX

Tracecuration of the second of

Š	Specimens	6	80	5	œ	15	15				П	
	đ.	NAS6204				'4" Dia.)	MS90353-08					
Fastener	Dia (in)	1/4			1	Open Hole (1/4" Dia.)	1/4					-
	adA	Æ			-	0pen	CSK	_				
Max Stress	Level (ksi)	34	34	34	40.8	40.8	34	40.8	34	40.8	1	
	Load Spectra	F-16 400-Hr	B-1 Eomber	F-16 C/D		F-16 400-Hr	F-16 400-Hr		B-1 Bomber		Strain Survey	
	Load Transfer	0					158					
No. Holes	per Specimen	1				-	4					-
	Test Series	IV(a)	IV(b)	IV(c)		IV(h)	IV(d)	IV(e)	IV(f)	IV(g)	IV(i)	
	Material	7475-T7351 A1										
	Specimen	0	•	ြ		(Fig 2)		0	0	•	10	(Fig 3)

Notes

- 1.
- Material: 7475-T7351 aluminum plate (1/2" stock) Drill holes using modified Winslow Spacematic drill without deburring
- Drill and install fastener per M198. 3.

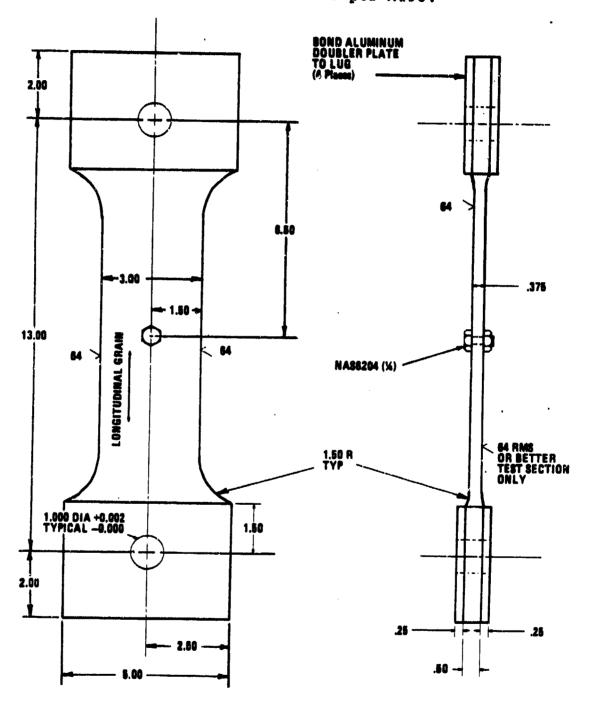
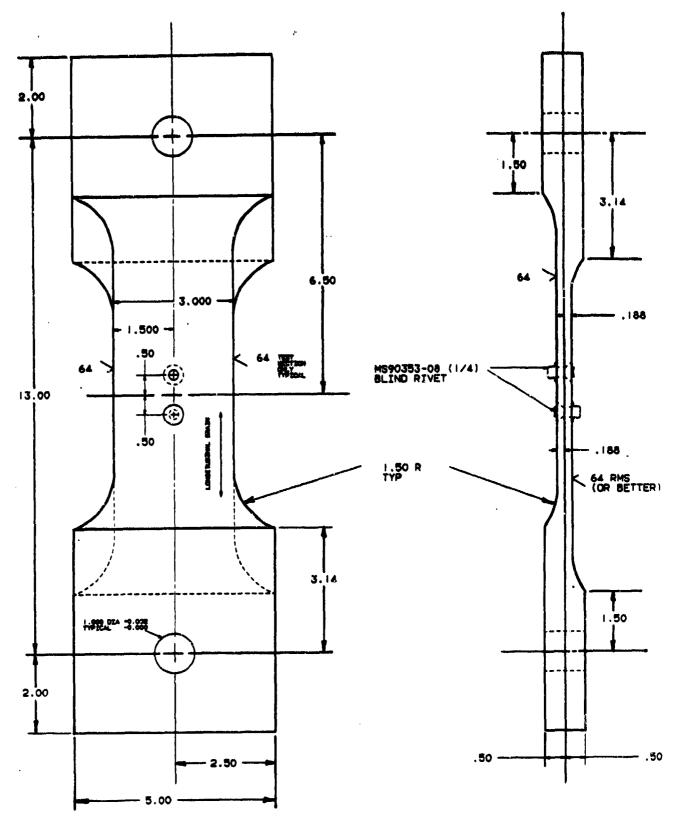


Fig. 2 Dog-Bone Specimen With Single Hole



- 1. Material: 7475-T7351 Aluminum
- 2. Match drill holes using modified Winslow Spacematic drill without deburring
- 3. Drill and install MS90353-08 rivets per M198.

Fig. 3 Double Reversed Dog-Bone Specimen (15% Load Transfer)

TABLE 4 TEST RESULTS FOR TEST SERIES IV(a)

FRACTOGRAPHY REF. PG.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
CRACK SIZE (IN.)	74 78 76 76 72 72 72
FINAL CRACK LH	
TTF (FLT HRS)	25931 26336 27551 28355 19884 21880 27827 25120 25150
SPECIMEN I.D.	MWPF -5(DUR 48) -6(DUR 41) -7(DUR 42) -8(DUR 43) -9(DUR 44) -10(DUR 45) -11(DUR 45) -12(DUR 46) -13(DUR 46)
MAX. STRESS LEVEL (KSI)	34
LOAD SPECTRA	F-16 400 HR

TABLE 5 TEST RESULTS FOR TEST SERIES IV(b)

		_							-
FRACTOGRAPHY	REF. PG.	D-2	D-3	D-4	10 -10	D-6	D-7	9-0	0-9
SI	RH	.6765	. 8294	. 6553	. 7279	. 7546	.8137	. 7895	6669.
FINAL CRACK	HJ	6062	. 9981	.6737	. 8943	.8475	. 8365	. 8991	. 7839
TTF	(FLT HRS)	36492	28051	38296	46494	35432	38296	43664	48494
SPECIMEN 1.D.		DUR	DUR	-7(DUR 51)	GUR.	OUR	-18(DUR 54)	-11(DUR 55)	-12(DUR 56)
	LEVEL (KSI)	34							
LOAD SPECTRA		B-1 BOMBER							

* MEASURED IN DIRECTION OF CRACK PROPAGATION WITH RESPECT TO BORE OF HOLE

TABLE 6 TEST RESULTS FOR TEST SERIES IV(c)

LOAD SPECTRA	MAX. STRESS LEVEL (KSI)	SPECIMEN I.D.	TTF (FLT HRS)	FINAL CRACK	SIZE (IN.)## RH	FRACTOGRAPHY REF. PG.
F-16C/D	34	WWPCL-1(DUR 142) -2(DUR 143) -3(DUR 144) -4(DUR 145) -5(DUR 145)	32124 * 55192 592 52 45992 38792	.9115 .9867 1.0334 .7356	.6584 .2110 .1570 .6901	2-3 2-3 2-3 2-4-3 6-3
	46.8	MMPCH-1(DUR 147) -2(DUR 148) -3(DUR 149) -4(DUR 158)	33652 21112 24708 32288	. 7144 . 9642 . 9281 . 9829	. 4823 . 3003 . 3843 . 3152	E-7 E-8 E-9
			24956 31252 24924 13888	. 7561 . 7561 . 8176 . 9001	.5316 .7431 .3924	E-12 E-13 E-14

35 E * LUG FAILED (SPECIMEN TESTED WITH OUT LUG END DOUBLERS) ** MEASURED IN DIRECTION OF CRACK PROPAGATION WITH RESPECT TO BORE OF NOTES:

TABLE 7 TEST RESULTS FOR TEST SERIES IV(h)

соно ѕРЕСТВЯ	MAX. STRESS LEVEL (KSI)	SPECIMEN I.D.	TTF (FLT HRS)	FINAL CRACK	SIZE (IN.)## FRACT	FRACTOGRAPHY REF. PG.
F-16 400 HR	¥	WWPFO -1(DUR 125) -2(DUR 126) -3(DUR 127) -4(DUR 128)	22348 15478 19635 24486		.8472 .7568 .6139 .6250	7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		-5(DUR 129) -6(DUR 130) -7(DUR 131) -8(DUR 132)	26886 26886 27235 22886	. 7558 . 9410 . 7726 . 8193	.3482 .6768 .3945 .7290	9789
		-9(DUR 133) -10(DUR 134) -11(DUR 135) -12(DUR 136)	23606 20435 23606 24000	• • • •	. 5909 . 5981 . 6584 . 7838	7-1-16 1-11-10 13321-13
		-13(DUR 137) -14(DUR 138) -15(DUR 139)	20035 21206 k	. 7966	.5816 .6256 	F-14 F-15

* LUG FAILED (SPECIMEN TESTED WITH OUT LUG END DOUBLERS) ** MEASURED IN DIRECTION OF CRACK PROPAGATION WITH RESPECT TO BORE OF HOLE NOTES:

TABLE 8 TEST RESULTS FOR TEST SERIES IV(d)

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PROTOGRAM	REF. PG.		6-2	100	7	· ir	, y	. 2	- q	9 6	9	2 -	2 2 2	7 ()	57-5	0-14	-	9-16
	28	E		-	6533			2000				-			1		-	- China
	HOLE	=	01.50	6893	75.00	4.	D'SEE	8	200	222	2010	9741		1000	2754.	2444	4003	3
SIN. S	18	₹.		1	ļ	6984								•	*			
CRACK SIZE	3	5	9025	4791	.6642	7855	No.	100	7916	1457	9341	1		2000	1.67(0		8949	?
FINAL CRA	1.8	Æ	15.4B	7244	-	-	-	-	1				-			. 6478	-	
	19E	H	!	. 8337	. 5946	. 1209	.6521	6660	.3519	7677	1885	5368	6857	1344	1000	. 9037	. 0921	!
	18	胀	. 7710		-	1	. 6226	1	1	1	1	.8197	.6836			1	!	
	HOLE 1A	H.7	.9138	.2743	. 5396	1921	. 7388		.2787	.6487	5 FLAM	8873	. 7384	1326		. (63)	. 9442	
	(FLT HRS)		21208	28436	33288	22836	17236	11608	19637	36036	1288e	15208	18436	21792		10300	31636	21636
SPECIMEN 1.D.			WAFKMR4 -1(DUR 61)	-2(DUR 62)	_						-9(DUR 69)	-18(DUR 78)	-11(DUR 71)	-12(DUR 72)				-15CDUR 75>
MRX. STRESS	LEVEL (KSI)		34															-
LOAD SPECTRA			F-16 400HR													_		

* MERSURED IN DIRECTION OF CRACK PROPAGATION WITH RESPECT TO BORE OF HOLE NOTE:

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TABLE 9 TEST RESULTS FOR TEST SERIES IV(e)

Control Control September Control

	PRACTOCRADHY	DE DC	H-2		H-4	H-5	9-H	1-H	H-8	Н-9	H-10	н-11	H-12	H-13	H-14	H-15	H-16	
	28	1		1	0.040	0.220	0.560	0.035	0.130	C.85	0.54	0.88	1	0.130	0.020	0.166	0.1726	
	HOH	1.1	0.1138	0.85	0.0944	0.240	0.680	0.000	0.160	0.88	0.63	0.88	1	0.180	0.092	0.272	0.2520	
	2A	ВН	0.040	0.180	0.080	0.150	0.350	0.210	0.070	0.250	0.390	0.64	1	6.61	0.030	0.042	0.5206	
nch)*	Hole	HI	0.060	0.2844	0.1117	0.180	0.410	0.220	0.098	0.315	0.540	0.78	0.010	1.02**	0.125	0.080	0.6137	
Fi: 1 Crack Size (Inch)*	1.6	RH	-	0.280	0.2504	1	0.260	0.51	1	0.140	0.035	0.070	0.540	0.080	0.55	0.230	0.1199	
1 Crack	Hcle 1	HT	0.0814	0.3016	0.511	0.130	0.290	89.0	1	0.158	0.070	0.070	0.590	0.160	0.678	0.350	0.0673 0.1427	
Fi:	lA	RH	-	0.205	0.750	0.55	0.410	0.070	0.58	0.190	1	 	0.510	0.152	0.320	0.46	0.0673	
	Al alc.	Ei	0.760	0.2363	0.790	0.79	0.420	0.000	0.65	0.270	0.035	0.154	0.515	0.170	0.442	0.72	0.1036	
	TTF	(Flt Hrs)	7297	2616	12968	9323	10943	8108	14589	13649	10567	9597	10972	11458	12592	16643	7732	-
	Specimen	QI	WAFXHR4-1 (DUR 76)	-2 (DUR 77)	-3 (DUR 78)		-5 (DUR 80)		(DUR			-10 (DUR 85)				-14 (DUR 89)	-15(DUR 90)	
Max	Stress	(KSI)	40.8														>	
	Load	Spectra	F-16	400 HR													>	

Notes: *Measured in direction of crack propagation with respect to base of hole

PARATER IN THE COLOCOLOGISM BASSISMINING A SUBSISMINING A SUBSISMINING OF THE SECOND AND SUBSISMINING A SUBSISM

^{**}Crack originated on faying surface.

TABLE 10 TEST RESULTS FOR TEST SERIES IV(f)

		Fractography	Ref. Pg.		7	ψ.	4	· iú	· •	7	o,	6.	1-10	111	12	I-13	14	I-15	1-16	
-		E	<u>2</u> 		-i	<u> </u>	I-4	I-5	-	<u> </u>	<u>-</u> -	<u>-</u>	<u> </u>	<u> </u>	-	<u> </u>	<u> </u>	<u> </u>	<u> </u>	
		2B	æ		1	1	1	1	1	1	1	•	1	1	1	!	1	1	1	
		Hole 2B	HT		0.1806	0.1761	1	0.0743	0.0466	0.5983	0.3708	ŀ	0.1469	0.8674	1	0.1041	0.6103	0.1887	0.1869	
	ch) *	2A	盟		1	1	1	1	0.7712	0.6421	1	!	1	1	1	1	1	1	1	
	Final Crack Size (Inch)*	Hole 2A	LH		0.1940	0.2866	!	0.1157	0.9225	0.7423	0.1757	1	1	0.0659	1	0.3786	0.4977	0.3651	0.4200	
	al Crack	18	RH		0.7740	0.6123	0.5690	0.6783	1	1	0.7213	1	1	1	0.7324	0.6919	1	0.9284	0.7940	
	Fin	Hole 1B	LH		0.9746	0.8178	0.8428	0.919	0.7005	0.1473	1.00	0.7450 0.2982	0.7268 0.3387	0.5266 0.1541	0.950	1.0249	0.5472 0.3723	1.1447	0.9502	
		Ą	RH		1	1	1	1	1	1	I I	0.7450	0.7268	0.5266	 	1	0.5472	1	1	
_		Hole 1A	LH		9060.0	0.4487	0.7605	0.07516	0.3332	0.1330	0.1972	1.10	1.0614	0.8991	0.3777	0.0624	0.9049	0.5080	0.4095	
		TTF	(Flt Hrs)		27830	39644	30470	42595	40698	42595	55677	40784	51352	55571	36743	4787C	38798	53832	46815	
		Specimen	ID	!			-3 (DUR 93)	-4 (DUR 14)		-6 (DUR 96)	-7 (DUR 97)	(DUR	-9 (DUR 99)	-10 (DUR 100)	-11 (DUR 101)	-12 (DUR 102)	-13 (DUR 103)	-14 (DUR 104)	-15(DUR 105)	
Max	Level	Stress	(KSI)	,	34.0														-	
		Load	Spectra		T-9	Bomber		-											-	

*Measured in direction of crack propagation with respect to base of hole.

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TABLE 11 TEST RESULTS FOR TEST SERIES IV(9)

	Max											
	Level					Fina	Crack S	Final Crack Size (Inch)*	*(1)			
Load	Stress	Specimen	TTF	Hole 1A	1A	Hole]	18	Hole 2A	2A	Hole 2R	ď	Practography
Spectra	(KSI)	ID	(Flt Hrs)	17	₩.	5	PH	LH	RH	I.H.	### E	Ref. Pa.
B-1	40.8	WABXHR4-1 (DUR 106)	15385	0.6935	0.5074 0.6118	0.6118	ı	0.2176	1	1	1	.1-2
Bomber		-2 (DUR 107)	17389	0.0337	1	0.4117	1	0.9139	0.6482	0.4123	,	7-3
		_	19815	0.5828	0.5238	0.5763	,	0.1091	1	0.2425	1	7-L
		(DUR 1	12644	0.1611	1	0.1088	1	0.7390	0.5930	0.2278	1	J-5
		~	16650	0.1700	1	0.2803	1	0.8008	0.6803	0.4864	1	7-6
		_	19815	0.1804	1	0.6531	0.3496	0.5684	1	0.4155	1	3-7
		(DUR)	12643	0.0981	1	0.2582	1	0.7386	6237	0.1517	1	8-1
		(DUK]	11589	0.1240	1	0.4091	!	0.5523	0.4987	0,0523	1	3-9
		~	15808	0.1489	1	0.3591	1	0.8323	0.7074	0.2668	1	3-10
		_	15595	0.2034	1	0.5681	1	0.5702	0.5429	0.2857	1	3-11
		_	11875	0.1156	1	0.0296	l 1	0.9536	0.7688	0.5191	1	3-12
	-	-	13700		1	0.1872	1	0.7463	0.6701	0.1218	1	J-13
		_	14540	0.7026	0.4960	0.4058	1	0.1177	1	0.0492	1	J-14
		-14(DUR 119)	13277	0.0664	1	0.1785	1	0.7646	0.7183	0.1490	1	J-15
-	-	-15 (DUR 120)	11486	0.2806	1	0.8247	0.7203	0.1157	1	1	1	3-16

* Measured in direction of crack propagation with respect to base of hole

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APPENDIX A

FRACTOGRAPHIC RESULTS FOR MULTIPLE HOLE DOG-BONE SPECIMENS (Phase 1; Test Series I(a))

CONTRACTOR OF THE PROPERTY OF

HOLE A GERE 1815 MFI -1(AL) 7 8 Brown CRACK FRACTOSRAPAIC 7 6 7. 6.0120 6.0200 0,0267 0.0135 0.0153 0.0224 2,0245 0.0292 20108 5186 0.00.96 0.0175 0.033 29200 28000 26800 27.200 28400 28800 79600 27600 30000 30400 30800 31200 31200 FLT 485 (3.40 LIVES) M5 90357-08 (4000) RINET Max. Stress Level _34.0 Ksi (Gross) Freemen NO. WET-1 (DUC.1) 7475-77951 Tes: pate 2-37-85 Both Load Trenster MFI Fatzue Life. Me. Thuknoss Ave. W. STh Spectrum Fastener Material Failure In Pata Set

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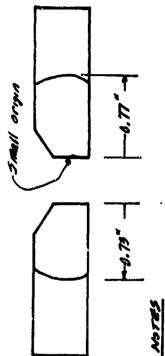
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Ü	6.55		6,72

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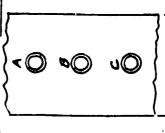
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MS 90353-08 (14 PIN) FIRET Freemen No. AFE: 2 (DUC. 2) Both Load Transfer 07. 7475-77951 Pata Set WEE Material Fastener

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Bross	Ceren	1/20	0.05-40	0,0415	0.0475	18200 0.0730	162019	6.0843	61600	6,1005	1084	6.1/66	0.1254	1/341	6.1435	6.1533	0.1630	17710	67810	1881	0.216	0.236	
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FR	CRACK	5/186	4600 0.0099	8010.0 0000	11100 0000	0800 0,0126	1200 0.0136	1600 0.0147	0.0158	2400 0,0174	1800 0.0191	1200 0.0212	3400 4.0234	4000 0.025-3	1400 0.0274	800 0.0295	5200 0.0316	400 4.0336	,000 0.0358	0.038/	1800 4.0422	1200 0.0454	
	77	165	1600	0000	0050	0800	1,200	600	2002	3400	800	200	3600	B	00%	200	200	700	000	2001	200	200	

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	8300 0.0	0.0
Are width	9200 1.0	3
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7,747	₹ĸ.	14000	14400	14800	15200	1500	14000	16400	16800	17200	17600	1800	0881	1880	1,5200	1960	2000	20402	20800	2/200	21400	72000
CKACK	3/26	20109	2.0115	6400 0,0128	2,0142	7200 0.0152	7600 00165	1870.5	P400 0.0194	8800 6.0208	9200 4.0224	9400 4.0247	20275	40304	10338	87507	8.0402	0.0456	5.0467	1.0505	27500	3850%
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Max. Stress Level 34.C (Si (Gross)

HOLE B 2815 2640 35% . #425 1277 . 24/2 Gere 282 . 3221 153 .5183 .382 .609 WFT-3(04) 23600 11600 23200 20000 20400 2/800 2/600 22000 22,600 00427 20800 38 area CRACK 10455 08500 *// 185 18.3 .0699 .. 724 1466 .2032 10425 28.200 .0762 1801: 2690 .0838 .0977 .1258 .0477 1587 12211 FRACTORRAPMIC 18200 14800 12400 14 CON 1 15200 15600 8 (6800 18000 1720 18900 19200 13600 Moos 16000 17600 1800 3 3 CAACK 51186 .0 525 .0250 2700. 2810. 89700 1870. .0359 1800 ,0306 18600 1900. .0/33 1010. 0770 6270. .0377 20/00 8110. .0163 1110. 1840 10000 1200 3600 4000 5600 6800 7200 248 9200 18 6000 5 7600 2600 10800 5200 8000 8800 1800 \$ 23600 FET. MAS. (2.95 LINES) MS 90359-08 (MAN) RIKET (610.5) Specimen No. WEST-3 (NA.3) F-16 400 HR Naterial 7475-T7851 AL. Both Load Transfer 07. Max. Stress Level 34655 Pet Set WEI Me. Thuknoss Fatywa Life Are. W.dth Speatrum Fastener Test pate Failure In A - 11

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8 370H .2658 . 4580 3015 1886. 6161: 28/2. 1245. ,237 1774 . 500 180 12 20000 2/200 WF-T-9(85) 23460 23600 17600 20800 00427 23200 21600 22000 22,600 7.5. Derra CRACK 0.43 9410 6760 62800 0358 1140 6550 .0604 7821. **** 650 ,0648 1600. 1920. 0860 1183 , #Z/ .093 \$611. FRACTOGRAPHIC 13200 15200 15600 \$ 18000 12800 16800 16000 17600 18400 6700 17200 1800 ¥ 4.7 11600 + 0.762 -CKACK .0267 1820. 1080. 5186 Nores 10000 3600 4000 400 5600 6800 7200 2400 8800 9200 10800 2000 7600 2600 1000 1/200 1800 2000 5200 \$ 23600 FET. MAS. (2.95 LINE) NO 90359-08 (MAN) RINET HOLE Crack Final Promensious (678) 5.260 (EL.) F-16 400 HR 1475-T7851 AL. Max. Struck level 34 KS Freemen No. WES-3 Bott Load Treaster WEI ME. Thuknoss Speatrum Fatzus Life Ars. W.dth Test pate Fastener A4 16+ Material 2791 Failure A - 12

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1972 - 9 (1964 4) 1900 1990 1	7475-77751 dd. 7475-77751 dd. 540379-08 (40-01) EINET F-16 400 HC. 50400 FC 188 (8.86)		MEC	51.80	***	7
	1475-77351 dd. 7475-77351 dd. 1475-77351 dd. 1590359-08 (49 ma) Eller 1-16 400 dd. 1-16 400 dd. 20400 fd. dd. (8.86)	+-+-+	.4.			
1879 - 7795 CL 1800 187	7475 - 77951 dd. 240357-08 (14 m.) Eller 1 5-16 400 Hz. 101 2405 (15 400)	++++	(110		00872	2850
1979 - 77751	7475 - 777551 dd. 1590357-08 (14 m.) Eller 15-16 400 H. 161 2405 (15 400)	-+-+	1800		23200	
	1875-77851 de. 2590357-08 (19 m.) EIRST F-16 400 H. 30400 Fee 188 (8.84/11)		15700		23600	64.40
	25 90359-08 (14 ma) Eller 1 F-16 400 M. 101 2000 (6000)		15600	-	74	+
	290359-08 (40 ms) sinst F-16 400 M. 101 2000 (6000)	+	///	+	3	+
	590359-08 (40 ma) EIRET F-16 400 MC. Softo For the (8 84)		0000	+	2440	0620.
155 150	590359-08 (40 ma) EIRET F-16 400 M. Softo For the (8 84 ma)		16400	8600.	24800	1080.
1,000	570359-08 (Man) Eight [-16 400 M.		16,800	0//0	25200	6883
1/600 1/6000 1/6000 1/6000 1/6000 1/6000 1/6000 1/6000 1/6000 1/6000 1/6000 1/6000 1	10 400 M. (610.00)		17200	\$2/0	2000	***
1	101 HEST (600)		17600	76/0	2602	+
Cotoo Coto	10 HOOM.		1000	6,7		+
	7-16 400 HZ	ļ	9		004.47	79//-
	101 HEST (600)		18400	29/0.	24800	1061
F=16 400 ML 1200 1700	101 HEE (610)		(8800	28/0.	27200	. 1467
	101 HEST (612)		1926)	0220	27,600	.//42
	701 MEST (6128)		19600	75.50	200	186
fave # CK Gross 13000 2000 1300	20 TO For the (8.84)		-		0000	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
	Former (6.8 (max)		20000	720.	28400	.Z035
Fe	John For the (0.8 Lines)	-	20 pc	9/20	2800	.2373
1/2 2000 1/2	30400 Fer 115 (8.82 mes)		20.80	0620	29200	77.27
1,800 2160 1,920 1,920 1,9374 1,900 1,90	Comment of the commen		2/200	0250	29642	77.7
						1
	184	-	2/600	×50.	20000	.377
Tare Promensions Mores Conce Sugar Conce	7,68		22000	2240.	20400	. 180
Find Finestions Find Finestions MOTES O Crack dimension in direction of	(4000	_ 	22/00	.0462		
Final Franciscos Suspensions in direction of					•	-
And Finestions Mores Court Size (Lu.) Court S						
Total Finestions Mores Mores Course dimension in direction of						
Final Finensions 1. Cleares 51850 (Eu.) 2. Cleares 51850 (Eu.) 2. Cleares 51850 (Eu.) 3. Cleares 61monsion in direction of		-			•	
Final Financisons Final Financisons Service Size (tw.) O Crace dimension in direction of	∵ (_	\			
Final Promensions Morres Conce dimension in direction of 1 (24)	_					
Final Finensions * Cents Size (Liu) * Cents Size (Liu) * Cents Size (Liu) * Chack dimension in direction of						
Final Framensions * Clark Size (tw.) * Clark	T 3-		-	-	ł	
Final Finensions * Clark Siego (Eu.) * Clark dimension in direction of 1/454 * 1/1/4		1.4.7	-6.749	-		
CENCK SIRED (TEL) Albert Albert O Crack dimension in direction of	12001	-		-		
1454 O Crace dimension in direction of	CROCK SIREO (EL.)	•				
7454	K1607		- £	7		4.4
	1884					

0.1628 0.1559 29200 0.1476 Cere 2015 29400 30400 30000 ₹ ₹ 6.0365 0.0822 0.0526 0.0721 0.0874 2.0459 0.0486 1,1235 2.0386 0.0421 6.0562 6.0008 6.0945 6.0997 0.0457 0.1052 0.1310 0.0761 5.11.72 25600 22 800 23600 24400 20800 22400 23200 26400 2 7200 27600 2/200 2 4800 25200 26000 26800 28400 21600 28000 72000 24000 0,014.2 6.0209 6.0237 0.0136 20100 0.0186 2.0285 81500 50122 9.0129 6,0193 0.0152 0.0251 0.0271 6.6302 0.022 0.0106 26100 0.0099 41100 12400 14800 17.00 12800 13200 17200 13/400 15.200 20000 008.81 14800 16400 18400 19200 14000 15400 00001 00/1/20 0008 1900 30400 FIF H-5 1 5.8 Lyes ATS 90359-08 (16 MA) RIVET MFI.4 (Dur.4) Mex. Stress Level 34,0 Ksi 7475- 77851 HEL Bott Load Transfer Fatzuc Life Me. Thuknoss ₹0. Test pate Are width Spectrum Pote Set Secimen Material Fastener Failure

Hole 8

WFI-4(81)

River

FRACTOGRAPHIC

たっと Crack HoLE

E.MR CRACK SIRED (EL.)	K1647	6.7454	421.0	0,/33
First CR.	16.87	0.49	0.068	0.050
1476		8	8	U

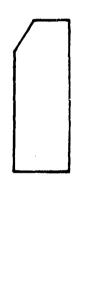
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Y TO direction of ? O Creek

28800 0.1395

6.0343

HOLE C CEEK 2015 WF3-4(CL) 38 erno 1.0543 1.0592 8.06 4Y 6.0456 6.00699 0,0749 0,0797 0.0983 13.0854 8080.0 6.133 1.0504 0.1057 0.114 FRACTOOR APMIC 2 8800 29200 24800 28000 25200 2400 26500 27200 27600 28400 26400 2560C 29600 30000 30400 7 7 23600 0.0365 0.0229 0.0100 6.0108 0.0125 0.0142 0.0172 1.0192 20800 6.0203 0,0270 6,0333 6.0143 0.0153 5.0216 22800 B.0299 22000 0.0257 0.0134 5186 1810.0 0.0116 16 400 17600 18000 1880 208 7/ 17200 1,5200 20000 21600 22400 23200 8400 2/200 19600 20400 MS 90357-08 (14 m.s) RIVET 30400 FIFTH 38 LINES WFI-4/ (DC.4) Mrs. Stress Level 34,0 Ksi 7475- 77851 2-11-85 Bott Load Transfer WFI なか Fatzue Life Me. Thickness Specimen No. Test pate are width Spectrum Failure In Material Pata Set Fastener



Hole Crack Fool Pomensions

3794	Ternet.	CRACK	51860 (EL)
	447	4	K1617
A	6.49		0.7454
8	0.069		6.174
J	0,050		0,133

NOTES

O crace dimension in direction of crack proposition

24400 00028

0.0396

	7.7%	CRACK	27	_	Cener	13	Cent
Pata Set WFI	2	5186	ARS.		2/30	18	2315
	1/200	\$\$00.	19200		1880	27200	. 1853
FREIMEN NO. WES- 5 (POL. 5)	11600	25000	19600	1	47500	17600	.307/
	12000	69000	2000		2530	7000	1886.
Material 7475-77551 AL.	12400	28000	20%pp		99900	2000	.366
	18800	20000	20,000		9770	2600	3758
Both boad Transfer 05.	13200	9000-	2/200		0/80	27200	.4X5
	13600	,0126	3/600		2680'	29600	#24°
Fastener 10590359-08 (1600) RINET	14000	.0 146	22000		.08%	30000	1.62.
	**	49/0.	22.400		.1070	1640	019-
Aro. W. 4th	(1800	18/00	72800		5911	A0802	.710
	15200	.630/	13600		11877		
Me. Thickness	15600	.0223	25600		7667		
	16000	.0245	24000		1514		
Spectrum F-16 400 HR	16400	.0263	2440		./689		
	16000	10263	24800		6111		
Mex. Straw Level 24KG (Grey)	17200	91600	25200		1814		
	(7600	0340	25600		.2035		
Faringue Life Blas Fer, Mes. (9,054118)	18000	1260.	26000		. 2237		
7	18400	10400	2440		.2439		
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HOLE CHACK MAST POMENSIONS

CRACK SIZED (EL.	, 52	(2) 250.	.200
C. Mar. C.	.710	250.	.180
2795	8	6	Ú

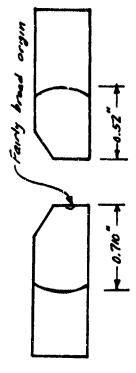
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Ocrace dimension in direction of crack properties. Crack sawed sinable to read trackgraphy

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26600

-7755 (ML S) (1200 0378 7750 -7755 (ML S) (ML S) (ML S) (ML S) (ML S) (ML S) -7755 (ML S) -7755 (ML S) (M		177	CRACK	F4.7.	CENER	3	Cene	
	er Wrī	1465	5186	Mes.	21.50	1 1 1 1 1 1 1 1 1 1	21/86	
		1/200		19200	0258	27200	╂	
175 - 7795		11600		19600	926	17/20	+-	
17 - 7185		12000		2000	0969.	7800	780	
1800 1800		12400		20402	1240.	28400	/23/	
19200 19200 19200 19200 1940		12800		- Ze 820	63.78	2800	32/2	
1959-08 (14 ms) 81ms; 19600		13200		2/200	57.60.	29200	162.8.	
## 1200		13600		3/60	Soto.	29600	4 082	
### 122		14000		22000	860°	30000	**	
## (1900 1520 . 4507 1500		1		22.400		1840	**	
## 1500 1510 1510 1510 1510 1510 1510 15	isth	14800	+	22800		30800	25.	
## (5500 .0122 2400 .0135 ### (6400 .0135 24800 .0136 ### (17200 .0135 2500 .0136 ### (1800 .0215 2500 .0216 ### (1800 .0215 2500 .0216 ### (1800 .0216 2500 .0216 ### (1800 .0216 2500 .0216 ### (1800 .0216 2500 .0216 ### (1800 .0216 2500 .0216 ### (1800 .0216 2500 .0216 ### (1800 .0216 .0216 .0216 ### (1800 .0216 .0216 .0216 ### (1800 .0216 .0216 .0216 .0216 ### (1800 .0216		15200		23200	2500		 	
## 1500 0125 24600 017	NUKAO K	15600		23620	2450.			
## 16 400 10132 24600 .077 25600 .0785 24600 .0785 25600 .0785 25600 .0855 25600 .0855 25600 .0855 25600 .0855 25600 .0855 25600 .0855 25600 .0855 25600 .1240		16000		24000	10,52			
34 KC (6108) (7200 .0/35 24800 .0780 34 KC (6108) (7200 .0/58 25200 .085 34 600 Fit Mes. (8,45 LIME) (1900 .0315 25000 .1032 4 (1900 .0315 25000 .1340 (1900 .0236 25000 .1340		16400	22/0	24400	///•			
#800 FET, MES. (8,05) 17200 .0171 25500 .0945 #800 FET, MES. (8,05 LIME) 19000 .0215 25000 .1035 A 1800 .0215 25000 .1035 A 1800 .0276 25000 .1749		16000	28/0.	74800	0820.			
3600 -017 - 2560 .094		17200	55/0.	25.200	8280.			
3000 Fet mes. (2,45 Line) 18000 .0112 36000 .1032 4		17600	12/0.	25600	**0.			
4 (4 the) 2150 . 0276 A 21600 . 0276 A 21600 . 0276 A 21600 A	Life ABOOFER MES. (B. 45 Lines)	18000	,0/92	26000	2601.			
12400 . 0276 26.600	2. 164	18400	5/20.	2640	541.			
		18800	9620'	26600	./240			
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HOLE Crack Finel Pimensions

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FRACTOGRAPHIC

HOSEC WFX-5(CH)

Test pate 2-27-85			CANAN YOUNG	2/10/	S. Long	2-1-1-1	DATOH LOIG-SAM
Jah Set WAFE	77.7	CRACK	FLT.	to to	CENER	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Cena
	13/00	13/00 0.0082	7.7	7 7000 4.0510	0.50	24 (101)	24 100 0 253
Freimen NO. WEE-S (NOC. 37)	14000	13000 00081	22	400	22400 6.0548	30800	30800 1.2800
	14400	14400 0.0100	22	22800 0.0580	0580		
Material 1413-77851 AL.	14800	14800 0000	73	23200 0.0630	0630		
	15200	15200 0.0 1220	7.34	600	23600 0.0695		
Both Load Transfer 0%.	15400 0.0135	0.0135	240	24000 0,0766	0770		
	74 000	14 000 0.0146	245	24400 0.0824	6824		
tastener mostoby-08 (10 ma) Kinet	74.400	14400 0.0159	24	2450 0.0887	1880	•	
	1250	1690 00175	252	25200 6.0963	0%3		
Ave width	17200	13200 0.0197	252	25400 6.1032	1032		
j	17400	17600 00214	760	26000 0.1108	8011		
ME. Thickness	18000	18000 0.0232	260	26400 6.1182	1182		
	18400	18400 0.0251	268	26800 0.1188	1188		
1 cornum F-16 400 HR	18800 0.0271	6.027/	272	27200 6.1282	1282		
	19200 0.0301	1050.0	276	27600 6.1374	1374		
Max. Straw Level 34.0Ksi (Gross)	14600	14600 0.0323	286	28,000 6,1500	1520		
	20000	20000 0.0345	284	28400 0.1631	1637		
Fatyue Life 20800 FIFTH 5/385 LIVES	20400	20400 60349	288	28800 5.1762	1742		
Failure In Mote	20800 6.0403	6.0403	292	29200 0,1902	1902		
	21200 0.0432	0.0432	7.8	80	29,000 00,2094		
: @	21600 0.6473	0.6473	800	80000 6,2303	2303		
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P.mension
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CRACK SIRED (EN.)	RIGHT	8.52	0.025	4,200
Finds CRA	16.97	0,710	6.035	0.280
3791		Y	9	0

sawed + unable to read trackography Mores O Crack

HOLE A orgin (Residy Mother Serveth) CERE 2015 WF5-6(AL) 38 Acres 1842. CENT ,32% .1470 13808 .2760 1465 7597 750 . 2043 112 186 710 FRACTOGRAPHIC W.de 14600 13600 15600 17600 4000 15200 16400 16000 0021/ 14400 16000 13 kg CKACK 1800; . 06.52 1860. 15/01 52/0 16200 ·0740 .0323 2750. 18/84 .0276 ,0576 .0847 5186 ,0500 1113 1269 27/0: .045/ ,00% 8610. 5600 2000 13200 6400 6000 7200 10000 1240 6000 7600 6800 1/600 12000 8000 9200 7800 10000 11200 10400 12000 FLT [7600 FUT. MES. (2.2 LIMES) NO 90353-08 (40 MA) KINET Mex. Straw Level 34KET (Grass) F-16 from 0% 7475-T7551 Freemen NO. WET-6 Both Load Treaster 16 to Fatzus Lite Spectrum ME. Thickness Ave. W.dth Fastener Test pate Factors In Material Pete Set A-20

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Finel Pimensions 5/2 ED (EU.) 0478 F. May CRACK ,565 1020 Crack 7866 4666 0

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Jah. Set WES	12 2	CRACK S186	7 27	CENER	₹ ₹	Cent	
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Material 1415-1751 AL.	9		14600	_			
	7200		15200	8621.			
Both Load Treaster 0%.	7600		15600	36211			
	9000		/6000	+/02.	ide same		
Fastener MS 90359-08 (16 ms) RINET	Grapo		16900				
	8800		16000				
Arts. W. Sth	9200		0021	_			
	200		17600				
ME. Thursdays	10000						
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14400 6.0220 1475-77851 AL. 19800 6.0239 1475-77851 AL. 15800 6.0239 14800 6.0239 14800 6.0341 14800 6.0341 14800 6.0343 14800 6.0341 14800 6.0343 14800 6.0343 14800 6.0343 14800 6.03438 14800 6.03438 14800 6.0478 14400 6.0478 14400 6.0478 14400 6.0478 14400 6.0478 14400 6.0478 14400 6.0478 14400 6.0478	to Set WFI	717	CANCK	F. E. T.	CENER		₹ §	Cesae 5/86		
1875 - 1775 AL. 1880 40.239 1875 1875 AL. 1820 0.03.5 1875 AL. 1820 0.03.5 1820		14400	-0	1		F 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1:				
1475-77951 44. 15200 0.02359 7	recimen No. WEE-4 (DUCIA)	14800	7							1
1600 0.031/ 1080 0.034/ 1080 0.034/ 1080 0.034/ 1000	1475-77851	15200	0 1							1
16 500 0000 0000 00000 000000 0000000 000000		14000	0.03//			: :		i !		
10 800 6.0366 1100 6.0359 1100 6.0359 1100 6.0359 1100 6.0478 1100 6.0478 1100 6.0478 1100 6.0478 1100 6.0478 1100 6.0478 1100 6.0478 1100 6.0478 1100 6.0478 1100 6.0478 1100 6.0478		16400	6.0343			,	!			- 1
11200 0.0373 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478 11400 0.0478		16 800	0.0366				Ţ			j
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File fee Me State (\$100) State	'e w, sth	1100	0.4.0		;					1 1
F=16 400 th.					:					1
1 = 16 400 ML 1 = 1200 E147 2.20 w = 5 1 = 1200 E147	E. Thickness	!								- 1
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HOLE C 2116 Cere WFI -6(CL) 350 BLAND direction of CRACK 1720C 6.0408 6.0672 FRACTOBRAPAIC 17600 ¥ % 6.0183 0.0332 0.0150 0.0205 0.0226 0.0247 6.0553 4.0140 0.0300 6.0103 1.027/ 0.0496 2186 0.0093 0.0370 0.0411 6.5451 10400 0.0130 6.0112 0,0111 1.0121 0.0141 O Creck 8800 4200 0016 13600 14405 10800 11600 7800 13200 1520 1560 0000 00091 16400 NOTES 11200 12000 12400 74800 1000 16800 17400 FIF HOS 2,20 Lives NS 90357-08 (16 A.A.) RIVET Mas. Stress Level 340 Ksi (Gross) 512E0 (EL.) 1.0672 8.0478 0,710 Specimen No. WEI -6 Over. 6) 07. 7475-77851 2-27-85 おっこ Eina Clerck Both Load Transfer MEI 40.020 0.545 <0,0,0 Cruck Fatzue Life. Me. Thuknoss Test pate Are. W. Sth Spectrum Failure In Pata Set Fastener Material 3794 HOLE T 8 **∆-23**

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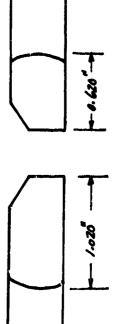
	NO. WET-7 (7.77	CKACK	1667	Core	134	20000
1675-7785 AL 2600 1088 10400 1088	NO. WES-7 (***	5/86	MEG.	41.60	***	
	NO. WES-1 (2400	0600,	10400	1920'		
1479 - 7795 At. 1500 10/10 1/100 10/10 1/100 1/	1475-77351	2800	2010	1000	.0833		
1913 - 1715 41. 1500 1/184 1/1840 1/187 1/1870 1/187	1413-11351	3200	8110.	11200	8160.		
		3600	2610.	11600	.1028		
		4000	. 1510	12060	1811		
100 100		4400	07/0-	12400	5/8/2		
1800 1800		1800	16/0.	1200	\$65/		
		5,000	2220	13200	/02/		
1000 1000		5600	25.55	13600	388/		
1	v. sth	6000	.0250	4000	.2235		
Cont. Cont		6400	2050-	44460	. 2580		
Concest Conc	hukness	6800	86.60.	1180°	.2970		
fave 34 LE (6108) 6400 6450 6600 5400 fave 34 LE (6108) 6500 0539 (6400 940 fave 251		7200	19801	15200	.3504		
force 34 Life Gross 6000 .0455 6000 .5400 .94 force 6000 .0519 .650 .94 force 6000 .0519 .950 .94 force 6000 .0519 .940 .94 force 6000 .0519 .94 .94 .94 .94 force 6000 .94	7	7600	80401	15600	425%		
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WES-7(AS) HOLE A 5,86 (for hole guality) \$ \$ in direction of ann ,078£ .2580 Cerek 100 . 3984 1881. 2812. .3167 280. 4500 37.80. 4240. 2011 .539 25.5 H; -Wide origin FRACTO & RAPAIC 15600 12400 1200 13200 13600 4400 15200 16000 1000 12000 10400 13 \$ 15 Y dimension 0.94" SKACK 5/86 . 6232 2010. \$120. .0326 O Creek Nores 2800 2400 1000 6400 6800 7200 3600 5600 8800 9200 1600 160 1800 7600 9600 5200 8 100 10000 Like S Baso 6000 FLT 16400 Fet. 45. (2.054, ME) 105 90357-08 (M. P.A.) FINET mark Promension F-16 400 MR 17 5.010 3 07. 7475-77951 Max. Strass Level 34 Kit Freemen No. HEE-1 Bot tod Treaster ___ NET .94 100 8 Fatzus Life Crack 150. Mr. Thuknoss AVB. W. STh Speatrum Jest pate Fastence Tarluce In Material Pate Set 2791 HOLE U 0 A-25

HOLE 8 CERE 2180 WFX-7 (85) ż 22 KLOS C. 8.38 1011 0.131 FRACTOGRAPHIC 15200 132.00 3.71-1-1 1000 9049 14800 7.7 A. 0.270 0.0297 10102 6.0117 G.0144 12:0:11 8.0776 6.0712 4,0131 0.016 O Creck Sacol 348 and 6300 10 800 1280 722 7400 8800 220 13200 14000 2711 Mores cono ass 222 13400 11600 17.42 baco 1040 16400 FIFT 5/205 1110 MS 90359-08 (16 MA) FIRET Max. Stress Level 340 KSL (Gross) 5.010 6.13/ W=E-7 (C) 07. 7475- 77951 2-27-85 First CENEX 13.60 WFI Both Load Transfer 0.180 Cruck Fatzue Life. Me. Thuknoss Secimen No. Test rate Are width Spectrum Para Set Material Fastener 7794 Hole 8 0 ۸-26

Jest Date 2-27-85			DING W WONING	Ring	Mrs - 1 (C.)	9704 (-7)	رو دو ر
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Specimen NO. WET-7 (DUC.7)	11600	6.0107			-		
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Material 1475-17851 4	12/100	0.00		<u>-</u>			
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ore width	14800	8,0222					
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HOLE B .7681 . 4603 4325 1484. 6/30 17176 Cere 2110 5424 1.020 ,3/0/ .3367 WFT-8(81) 75200 26400 28000 25,00 2440 7/80 27200 27600 26000 26000 38 River CRACK 1290. .0729 22.90 1055 (050) .0687 21.30 2290. 1960 3011 1522 43% 177 12599 .0779 1285 1692. 186 ./958 .2138 .237/ FRACTOGRAPHIC 7600 20005 12000 23600 24000 20800 22,400 23200 15/2 7200 2/200 22800 1/1/00 6000 /7200 100 2/600 ¥ 5 1 1660 17600 200 CRACK 1800. 5186 10414 16001 £5/0. 1220. .0268 .0346 ofth £210. 9610. 0420 6000. .0262 040 79/0. :043 240. 10202 .0378 .0377 12400 13200 12000 1/600 1800 8400 10000 1/200 10000 13600 8200 10400 1500 1400 15600 200 15200 2000 Per Mes (3,51,00) Fastaner MS 90359-08 (400) RINET Freemen No. HET-B (AVE. 8) Motorial 1475-77851 AL. 07. F-16 400 HR Max. Strass Level 34KSI Both Load Treaster ME. Thucness Fatzus Lite Speatrum Ave. W. Sth Test pate Pete Set



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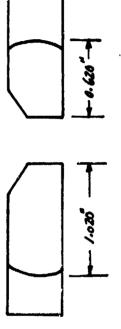
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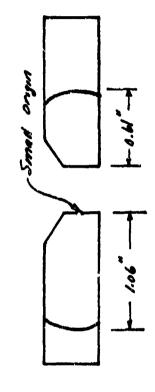
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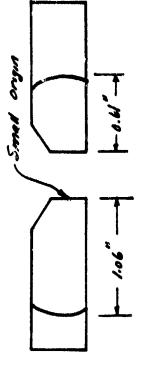
4x 5/260 (54)	.6.	Ø 22.	.25
Frue Cert	1.06	.25	. X5
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MOTES

in bore of hole @ Read smaller wack O Crack

WES-P(AS) Mern FRALTOGRAPHIC

HOLE A 2861. 569/ .:840 * 15.26 #22' 250% . > 2.96 . 0 £ M Š. 18/1 X1/1 1387 CERE Die. Sm7 £34. £ 50. 1200 1 ×10. 20706 35600 35200 36000 2680 3345 36400 29/40 3500 3/60 3240 2000 3460 37200 39 800 800 3040 37,200 3240 3200 \$ £ .022 5210 \$810. # . · O M'S 58/0. 2160. 1620. .2620 CRACK 9220. 6.40. 08/0. 1120. 3750 .0376 510. Wa. 1110. 1/20 . 01/7 Ş 2600 27600 22000 2000 20400 23600 2780 25600 26400 73200 2000 2400 2400 2/600 27200 2200 2/200 27/20 25200 ¥ % Y CRACK 5186 20000 00961 12000 13600 17600 18800 19,300 14000 800 15600 18400 16000 12800 /3200 460 15300 17300 10000 64.50 1400 11800 36 480 FX. MES (A 56 LINES) NE 90353-08 (4 M.) RINET (gres) WFS-9 (QUE. 5. 1475-T7851 AL F-16 400.4R Max. Straw Level 34 KEE Oost load Transfer 164 ME. Thuknoss Fatzus Life Freemen No. AVE. W. St. Speatrum Test rate Fastener Failure In Material late Set



Crack Final Pimensions

A - 31

CK SIECO (EL.)	/9:	.zz @	,25
Finds Clear	1.06	.25	.25
379/	R	8	د

Nores

CARR in drawn of dimension O Creek

smaller crack in bore of hole O Read

ACLE CELER 1001 (50) 6- EM below this pent FRACTOGRAPHIC 13 £ smaller crack to read 0.0851 6.153 0,1399 4.0931 6.133 & DIFFICULT O crace 32,800 33200 33600 34400 NoTES 32,400 34000 36,400 31 600 34800 3/200 32000 35200 36000 35400 93198 36480 FIFT 1454 LIVES NS 90353-08 (40 ms) RINE 0.22 WFE-91000 MET Tine! 0.2525 Bott Load Transfer Was. Stress Level 1.06 Crack Fatyue Life. Me. Thurnoss Secondo No. Jest pate Ave w. Ath Spectrum Failure Im Sata Set Material Fastener 3794 HoLE Ø A-32

HOLE C 0,2263 5.2425 6.2097 0.252.5 0.1990 SEE 5180 35 202 NEZ-9(CT) 36.50 35600 36000 3640 38 KLOS 0.0440 1.0656 6001.0 1.0483 0.0530 1,0853 CRACK 1.0579 5.0780 00922 8.0003 0.1380 0.0460 3.0718 1,1200 801119 26/2 0.0511 1884 3.1091 6.1291 1515 F. ACTOGRAPHIC 26800 2800 28800 3/200 2 2200 28400 29200 30800 32000 32800 32400 33200 34800 27400 29600 31600 33600 34000 34400 3000 30400 1.0285 1,0398 0.0137 6.0163 2200 0.0205 0.0248 6.0127 80100 2/400 0.0190 22400 0.0219 0.6236 0.0107 6.0271 1840 p. 0100 20176 1,6309 1.0329 1.0357 18800 0.0118 5.042/ 5186 19200 18800 20802 19400 20400 22800 21200 2000 23600 24900 2400 25,200 25600 23200 24800 2600 20492 36480 FIF # 14.50 LIVES MS 90353-08 (400) KINET Max. Stress Level 340 &si (Gross) MFI-9 (DUC. 8) 0, 1475-77851 2-27-85 Bott Load Transfer MFI Me. Thuknoss Fatzue Lite. Secures No. Jest vate Ave W.dth Speatrans Pata Set Material Fastener Failure

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Service Control

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Hole Crack Final Pimensions

CK 5/200 (EL.)	11912	19.0	0.22	6.25
FINE CRACK	1697	1.06	0,25	6.2525
1476		8	8	Ü

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Ocracs dimension in direction of creax proposed to keed Smathr creek in bore oftole

155 pate 2-41-85								
	FLE	CKACK	727	CEAR	Per	Geree		
Pata Set WFI	wes	5186	MEE.	24/	.	2815		
	8800 0.0095	2.0095	17200	17200 6,0377	25400 6.1145	6.1145		
SACIMEN NO. WEI-10 (DUC.10)	4200	1200 0.0104	17605	17600 0.0403	26000	21000 0,1225		
	9400	1,00 6.0115	18,00	18,000 00426	2640	2640 8.1306		
Material 7475-77851 AL.	10000 0.0125	1.0125	20/20/	0.0457	20800	26800 0.1385		
	10400 4.0134	4,0134	0088/		27200	27200 0.1475		
Sott Load Transfer 07.	10800	10800 1.0145	19200	19200 6.0500	27600	27400 6.1576		
	11200 6.0156	1,0156	19600	1960 6.0523	25000 6.1650	6.1650		
Fastener MS 90359-08 (Mara) RINET	11400 0.01165	0.0165	20000	2000 0.0552	28400	2840 0.1807		
	12000	12000 0.0175	20402	20400 0.0578	288CC	253cc 0.1975		
AVE. W. STh	12400 0.0188	88100	20800	1,000	29200	29200 0,2139		
	12800 6.0197	5,0197	2/200		29600	29600 0.232Z		
ME. Thuckness	13200 6.0206	6.0206	21400		35000	0.250		
	13400 0,0218	9,0218	22000	22000 6.00.70				
Spectrum F-16 toxe	14000 8.0230	9.0230	22400	22400 6.0209				
!	14400 6.0245	5,0245	22800	22800 0,0137				
Max. Stress Level 34,043c (Gross)	14900 00241	6,0241	23200	23200 00770				
	15200 00221	0.0277	23400	13600 00817		-		
Tathoure Life 30000FIFH05/375 LIVES	15400 0,0294	0.0294	24000	24000 0.0872				
	16000 0.0309	6,0309	24400	24460 J.0934				
alue to total	16400 6.6531	6.653/	24800	24900 0.11009				
≺(14800 0.0354	6.0354	25.00	25.200 6.1077			-	
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FRACTOGRAPHIC

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WFE-10(AL)

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1655 pate 2-31-85	617	CARCA	
Path Set WFT.	3	5186	
	12400	124000.0098	
Freemen No. WET- 10 (Out.10)	12800	80100	
	13200	4.0114	
Motorial 1475-77851 AL.	13400	13/400 0.0125	i
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both Load Transfer 0%.	RAP!	8.0144	
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Fastener M570353-08 (14.00) filet	15200	9,010	
	1500	8270.0	
are wisth	14000	961010	1
	16400	3.0206	
Mr. Thicknoss	16800		!
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Speatrum F-16 touth	17600	0.0245	,
	1800	0.0244	;
Max. Stress level 34025i (Gross)	(880	0.0286	
	1880	20800	ì
Fatywe Life 30000 EITHON 3.15 Lives	18200	5.0317	
Failure In the C	1940	4.0333	1
{	20000	6.0358	i
	20400	0.0380	
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Fool Promensions Crack HoLE

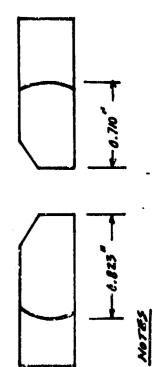
	1616	4.220	10.025	6,710
FINE CRACK	1427	0,250	2.152	0,823
146		N	8	C

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(20)-5-14	145 145	21.50	8200	26.	.0413	,04%			1760 . s St 7 26000	21900 00081	(2*the .0463	1600 .0714 27200	1	7600 .1675 26000	20000 .08K 26400	50to 146 Zebo	20800 1004 29200	2/200 .1076 29600	2/600 ///44 30000	22000 ,/2/9	224co ./303	2500 ,1919	1/2/100 1/2/1					* S. P. P.	- 2//9	· · · · · · · · · · · · · · · · · · ·
F. F. F. TO & SOME	FLT. CANCK	ARS 5186	6800 .0079	7200 . 0087	7600 .0099	_	4400 10117	+		9600 .0 168		-	7	1/200 .0/93	_	(2200 0027	_	 -		(3600 .0293	\dashv	0	1400 .0357					0.825		NoTES
Test pate		late Set WFI		Freeman No. WET-10 (PUL.10)	,	Motorial 1475-77851 AL.		Both Load Transfer 0%.		astener NO 10359-08 (Hora) Kinet)	476. W. 619	ì	ME. Thickness		Pearum F-16 took	•	Mar. Stress Level 34 KB (Gregs)		Fatyus Lite 30000 Per. 1864 (3.73 lives)	ħ) %	0	U	•	•	Crack mast	HOLE FINDS CENCK SIZED L'EL.)

HOLE C 3742 55x7 3153 1082. 282! 1973 12577 TILE. 794. 185 1467 7 GER 210 .1653 took. 1531 11811 WES-10(CS) 29600 27600 Joons 25700 7,000 24400 26000 29.200 2600 27200 26.60 26/20 252 Arra 2860. .0987 2770 285 8470. .0256 CELER PEXO. 1220 2820 8240 600 38 2090-5124 2160. 1450 .0%3 1980. 1150 SX: FRACTOGRAPMIC 22000 Sakor £3200 22/20 22000 2000 20800 2/600 7600 15200 17200 1800 16000 1800 940 2/200 17600 , 82.75 CKACK 6610. 8600. 0//0' 10/01 25/0 X10. £81.6. 3020 5186 7200 9600 6000 6000 9200 11200 760 Soco 0000 12000 1800 Att 1040 Adeo 11600 12/20 13600 1200 30000 Per Mes (2.7561145) NS 90353-08 (400) FIRET 6,2 WET-N 7475-77051 ALLA. Straw Level 34 KG Bott Load Transfer KET 164 Me. Thuknoss Fatzus Lite Freemen NO. Speatrum Ave. 14.5th Tastener Test pate Farlace In Material Path Sex



Hole Crack Finel Pronensions
Hole Fine Crock Star (Ex.)

A .250 .220

B .152 <.025

C .829 .70

O Creek

A--37

¥ 370H Cere 2160 WES-11 (AL) \$ 8 Green CKACK . 2392 ACC. 1412: .650 186 1529 3524 .4032 177 198 . 27/2 1/26 1699 3076 090 FRACTOBRAPAIC 80 fec 200 19200 17600 1800 7600 1520 15600 2000 10400 16000 17200 16 100 ¥ 7.7 440 2860. 2630 .0677 6/0/3 CRACK 26/0. 1220 10.257 20295 1200 0567 0723 1000 1237 1800. .0019 0/33 .0313 5/26 77/0. 11107 6//0: 4000 13600 9999 0000/ 7200 940 8600 200 13000 17200 A Kao 10/20 1/600 7600 0000 Acco 9000 1/200 1200 9200 12000 1040 FL 1165 (2.55 Lines) NS 90353-08 (40 ma) RINET Max. Strass Level 34 KSE (Gregs) WET-11 (AM. 11) F-16 400 UR 7475-T7881 AL. 07. Sott bad Transfer __ WEI 16 to Fatzywa Life ME. Thuknoss Freemen No. Material Ave. W. Sth Speatrum Fastener Test pate Failure In Para Set A-38

NoTES

Finel Pimensions

Cruck

4616

E.Ma CRACK

2794

2201

2000

O U

.380

77

Ocure dimension in direction of crack fraportion

@ originated out on countersink surface

HOTE W . 2480. 13001 .0080 .0066 7900. Sere 2116 12000 á WEI-11 (AS) 5700 2600 6000 6400 2300 5600 0009 38 Serek 2412. 27/1 (22) .4536 XX. 145 7/2 462. .750 2295 SON. FRACTOGRAPHIC 19200 16000 1000 1300 70 fec 000991 /7200 10400 12600 16 900 17600 15600 CRACK €870. .0458 1280 7620. 1240, ** 10/0. 1210 6250 3460 4540 0740 2970. 7980. 0200 .02M 1050. 86/0 19/0. 1750. . S. 3. 7200 9999 0000 8800 980 7600 7.60 /0**2**00 1/600 13600 40, 2200 1300 /Zee 12400 1300 250 20400 Pet Mes (2.55 Lines) N5 90353-08 (HAN) FIRST Max. Struct Level 34 KCE (Greg) WET-11 (AM. 11) F-16 400 HR 7475-T7851 both toad Transfer 16 to Fatzyno Life Freemen No. ME. Thuknoss AVB. 14.5Th Speatrum Fastener Test pate Material en set

MOTES

Anel Pemensions

Crack

Hole

2797

in direction of creak O Creck dimensions

countersink surface

0

220

.66

MOTES

Finel Pimensions

Crack

Hoce

3794

0.025

0.0895

8

2.25

O crack dimension in direction of crack proposto

O originated out on countersink aurtace

HOLE B CERE 2180 WFI-12 (BL) १ ह Brown CRATK .0863 12/01 134 3 9/50. . 679% 10937 .1146 100]: 100. 2770 1625 \$1210 7/2/1 1397 FRACTOGRAPMIC 36000 25600 3840 26600 24000 27/60 3026 Zhoos 2760 2600 27200 37200 25 Zec 3640 MES. F47 CRACK \$820. 6880 ,02M 19/0 0257 .040 . 6003 1880 51860077 .0/2/ 2770 ,0151 0600 300. *** 62/0 103/1 0000 Lyan 17600 22800 20000 2/200 23200 19600 2240 140 17200 19900 2640 2/60 22000 18000 1940 19200 2000 30240 F.T. MES. (3.78 LIME) NES 90353-08 (14 ma) first (S. 12) 07. Max. Strass Level 34KSE 1675-77851 Freuman No. WET-IL Both Load Transfer _ 16/12 8 Cathur Life ME. Thuknoss ANB. 14.4Th Speatrum Fastener Test pate Facture In Motorial Pate Sex

MOTES

Fast Francasions

Cruck

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512 60 (EL.)

Fire Clerk

7616

2.080 €

æ. 100' €

3/8/

€.180 €

1450

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A. A. SO. ...

O crack dimension of direction of crack fraposition

due to load cell

O originated on counters.

Surface

O surface crack

© specimen bent in Compression malpunction.

@ Hole with Laryest crack.

A-41

B 370H Cerek 2815 WF5-12(85) 78 aren CRASK .0185 8270. 6610. 10/0. 1410. 8//0: .0.53 12/00 FRACTOGRAPHIC 28000 25,600 27600 28400 27.200 2440 2760 20402 30000 30260 26000 2600 27200 2/20 25 Za 3640 Y Y CRACK 17600 1860 2/200 16000 16400 0089/ 23200 1940 22000 22400 19200 17200 1800 20000 20 Feb Zadeo 2/600 22800 23600 18000 Fatzus L. fc 30240 Fet MES (3.78 LIMES) M5 90359-08 (40 mm) RINET (84.8) Freemen NO. WFT-12 (14.12) 7475-T7851 AL. F-16 400 HR Boit boad Transfer 07. Med. Strass Love 1 34 KSE ME ME. Thuknoss Material Speatrum AVB. 14,614 Test pate F.stener Failure In Pete Set

G Surface crack O Originated on Countersu Surface

NOTES

Finel Pimensions

Crack

16:6

FINE CRACK SIEED (FL.)

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O crace dimension in direction of crack Importion

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O Make with Largest CRACK.

でものののは、関係などのなどを持つているのでは、してなる。

A-42

Ø Hola .435° 222 . 22.09 252 2015 .330 3677 1170 CERK .5747 .2/00 .301/ 167 15% WF5-18(04) 32400 28860 20100 Jeffer 27/50 3/200 32000 26000 Joac 2 3/660 ₹**₹** 7200 DINTR CEAR .0620 1340. 65.40 21119 032/ et: 1250. 1022 2200 1366 05.00 10.01 .0778 .080 41 6770-.0726 10.573 1 -/763 1618 FRACTOGRAPHIC 2000 24600 7500 20000 22000 2,5600 26800 20002 2010 21200 9422 9927 23600 25260 232cm 2/600 26500 26400 7000 当 .024 .0336 5176 10.0 .0303 2000 2000. \$0/0 10/23 100 290 10/12 1820 0320 3360 200 1020 2220. .0338 86/07 2/10 15200 1700 1/200 16000 Beso 12000 1260 13200 (4100 1900 //Z00 (Sec.) 1800 7000 240 18600 16400 1 face Fatyus Lite 32400AT. ME. (4054ms) N5 90359-08 (HAN) FIRST MAN. Street Level 34 KLF (Greg) Freemen No. WES-13 (DVE. 13) F-16 400 Hz 1475-T7051 AL. Bott toad Transfer 07. Path 5et WP 16 to Me. Thuknoss Speatrum Ave. W.dth Material Test pate JOURISE. Failure In

.1950

27600

340.

13200

HOLE CIACK MAST PLANEASIONS

CK STREET (SEL)	107121	.240 3	.760	
FINE CRACE	1007	. 260	.856	6.010
3734		8	8	Ü

Integation

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direction of

@ Froetune surface sewed to Fractography

dimension in

Mores O Cress

A-43

(((d) | (-0.70) | (-0.70) |

Hole Crack Final Pimensics

MOTES

Ocnece dimension in direction of const proposed brackure surface sunded no trackography

	1655 pate 2-11-35			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1				
1700 1.0.0		777	CRACK	K4.7	CENER	124	CEARE	
\$\frac{\(\text{Pic} \) \(\text{Pic} \)		3	5/26	MES	21.80	87	2015	
#55-14 (W.r.) 4		24/20	0.9081	00.5 %	6.0452	25200	0.1831	
1000 0.0373 1700 0.0373 1700 0.0373 1700 0.0374 1700 0.037		8800	5.0.00	17200	0.6484	2,54.00	1,1950	
675-77951 AL. \$\frac{\chi_{1000}}{1000} \\ \frac{\chi_{1032}}{1000} \\ \frac{\chi_{1032}}{1000} \\ \frac{\chi_{1032}}{1000} \\ \frac{\chi_{1032}}{1000} \\ \frac{\chi_{1000}}{1000} \\ \chi_{100		1200	8.C119	17600	6.0573	24000	1.1005	
1000		3775	0.6132	18000	8.0544	2740	4.2184	
67 07. 1040 4.0140 1880 1.6421 1200 2.0172 1900 6.0153 11200 2.0170 1900 6.0183 1200 2.0170 2.0170 1.0191 1200 2.0170 1.0191 1200 2.0170 1.0191 1200 2.0170 1.0191 1200 2.0170 1.0191 1310 2.0191 1.0191 1310 2.0191 1.0191 1410 1.0192 1.0191 1410 1.0192 1.0191 1510 1.0192 1.0191 1510 1.0192 1.0191 1510 1.0192 1.0191 1510 1.0192 1.0191 1510 1.0192 1.0192 1510 1.0192 1.0192 1510 1.0192 1.0192 1510 1.0192 1.0192 1510 1.0192 1.0192 1510 1.0192 1.0192 1510 1.0192 1.0192 1510 1.0192 1.0192 1510 1.0192 1.0192 1510 1.0192 1.0192		10000	0.0146	1848	1.0586	26800	0.2336	
10800 5.0177		0401	0.0160	18800	1.6421	12200	6,2493	
11200 6.0170 19400 6.0740 1000 6.0740 11400 6.0204 20000 6.0740 12000 9.0204 20400 6.0740 12000 9.0214 20400 6.0850 1.0800 6.0850 1.0800 6.0800 1.0800 6.0800 1.0800 6.0800 1.0800 6.0800 1.0800 6.0800 1.0800 6.0800 6.0800 1.0800 6.0800 6.0800 6.0800 1.0800 6.0800 6.0800 6.0800 6.0800 1.0800 6.08000 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.08000 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.08000 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.08000 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.0800 6.08000 6.08		10800	5.0172	19200	6.0683	2 7600	1.2455	
1/400 0.0204		11200	0.0110	19400	6.0740	28000	0.2535	
12000 5,0214 20400 6,0850 6,0850 1,0850		11400	0.0204	20002	1827	28462	8.3018	
12400	Ave welth	12000	9.0214	20402	0.0850	2830	6.3266	
12800 5.0249	i	12400	0.6234	20800	6.6903	29200	6.3389	
7.16 400 416 340 656 (600) 1400 0.0320 1400 0.0330 1400 0.0339 1500 0.0352 1500 0.0352	Me. Thickness	0287/	3,0249	21200	8,0472	29340	0.34.8	
740 40285 340 654 (6109) 14400 6.03.80 14900 6.03.89 19800 6.03.89 15400 6.03.82 16400 6.0410		13200	0.0264	21400	8.1637			
346 650 (6000) 14000 4,0320 14800 4,0339 19800 4,0339 15400 4,0352 8 (4000 6,0410	•	1360	6.0285	27.000	6.1167			
29340 Est. (600) 14400 1.0320 29340 Est 14400 1.0339 15400 1.0352 8 16400 1.0352		74000	0,6300	22400	0.1178			
19360 61147-5 547 LINES 15400 6.0358 15400 6.0382 14400 6.0410		1 4400	1.0320	22800	0,1260			
1936064475/35714465 15200 0.0358 15400 0.0382 14400 0.0410		14800	2.0339	23200	1,1351			
15400 4.0382 14000 6.0410	Father 6, fe 29360 fitting /357 Lives	15200	0.0358	2360	1.19.22			
14.400 0.0410	B	15400	6.0382	2 4000	9.1544			
	1	14200	6.0410	24400	6.1643			
	< (14400	0.0427	24800	6,1735			

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HOLE Crack Final Pimensions

A .369 <0.010 8 /.03 0.31 C 0.111 <0.00	7476	F-MAK (CRACK	SIZED (EU.)
o		1821		R1617
, ,	8	398	,	46.610
7.	8	1.63		0.39
	7	0.111		<0.010

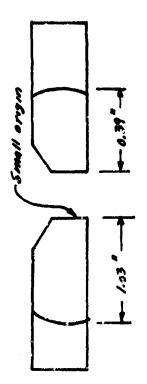
Notes

O Grace dimension in direction of crack proposition

HOLE

THE RESIDENCE OF THE PARTY OF T

Ist pare							
	727	CKACK	277	Chris	7,50	Colour	
Path Set WEI	***	51.86	.44Ec.	1/26	\$	2315	
	5600	8091	1400	(2.4.5.)	=\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	.2323	
Specimen NO. WEI-14 (Dec. A)	0009	20/07	SAN	1000	22.00	3462.	
	4	0110.	120cm	15.20	23800	\$572.	
Motorial 7475-77851 AL.	0089	81101	00Z.7	7.52.67	2560	53827	
	7200	92701	. 15600	6/50	24000	25.50	
Both Load Transfer 27.	760	10/57	//000	/2997	3460	.3260	
	8000	, o 149	16400	.0738	32.5	3992	
Fastener MS 90353-08 (Man) RINET	9780	-0/64	16000	3080.	25700	23762	
	8800	20175	/7260	1980	25600	4602	
Are. W. Sth	9200	06/0.	7600	9860.	26000	.4265	
	200%	.0209	10000	18/2	26,600	1.452/	
Mr. Thusness	0000/	10227	1840	800%	26.00	22.6	
	40/	3420	13/00	52/11	2720	.5387	
Spectrum F-1h 500 HR	10800	.0266	7200	2677	37600	4025	,
	1/200	5020.	19600	1881	2,000	7291	
Mex. Street level 34 Kitt (Gross)	11600	2050.	20002	7257	28.400	887	
	1400	6280.	204th	76.57	2800	1,253	
Fathana Lite 79360 Feet Mes. (3.674, 100)	1240	1036	2000c	1704	27200	259.	
	12820	10368	X/20c	./930	29360	040%	
Failure In Mole D	/DZ00	23.52	2/600	1902.			
∢(10600	.0422	32000	. 2017			
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85/							
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4.000 39 Finel Find Cent .390 Crack 3791 Hole

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MOTES O Creek

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4066 8 2880. 9810. *50. Pes 2. 0550. 252/ 790, · ** 71800 1091-¥13. 9220. . . 377 . ozze CELLE 1815 . 183 275. 10/9. 88. .00 WFT-14(05) 20 400 27200 28600 24000 26000 2600 2000 27600 2350 37. 25600 2600 2400 750 25200 2720 23200 58 ans CELEK 3/1 FRACTOGRAPHIC 22000 15600 16000 16000 2/600 1640 67.50 17200 7600 1000 13600 ZOBO 18000 1200 2000 X/Z00 1840 4 i j 9200 2600 10000 12800 0000 1/200 1200 999 7600 8000 200 11600 10500 13600 40 7200 10000 240 1700 8000 40/ 79760 Feet 1865 (2.67411005) MS 90353-08 (40 ma) RINET FREIMEN NO. WFI-14 (DIG. 19) 7475-T7851 AL. F-16 400 HB 07. Max. Stress Level 34 Kit Both Load Troaster _ 16 to Fatzywa Lite ME. Thuknoss AVE. 14,5th Speatrum Test pate Fustener Material Failure In Pete Set

THE REPORT OF THE PARTY OF THE

Moderal Indianalist Carriers (Francisco)

Smell organ 1 1.03

> mast Promensions Crack 71016

2791	Finds CRACK	CK STERO (EU.)
	4427	10012
V	066.	010'7
8	607	66'
J	///	0/0.>

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in direction of

O creek MOTES

A-47

U HOLE CERE 2186 WFT-4(02) 3 8 aus 8760.0 9.0509 0.0558 1.000 9,0763 3.04.56 1,070,0 2830 1.0899 1.0951 0.1013 0,1110 FRACTOGRAPHIC 25200 25000 26000 2642 27200 28400 27600 28800 26800 28000 19200 2 9340 FLT 0.0302 CKACK 6.6244 6,0325 6.0279 0,0097 1.0145 8.0186 6,0200 1,0230 0.0370 4.0404 1200 0.0117 0.0135 Sec. "2 0.0214 1200 80345 0.0430 1,0/26 0.0174 12200 00101 00871 1800 19400 20400 2/200 22800 23 200 18800 20802 22400 24400 1920 21600 23600 24800 22000 ans! 20000 24000 29340 FIT hos/3,4761465 M5 90359-08 (400) FIRET Max. Stress Level 34,0650 (Gross) Freimen No. WET-14 (Dur.14) 07, 7475-77851 2-27-85 Bott Load Transfer Pata Set WEE 各市 Fatzue Life. Me. Thuknoss Test pate Ave. W. Ath Spectrum Failure In Fastener Material

Hole Crack Final Pimensions

3794	Finds CRA	CENCK SIZED (EN.)
	1697	RIGHT
R	0.390	7007
8	1.03	6.39
Ü	1117	010.01

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O crack dimension in direction of crack proposton

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HOLE A WFI-15(AL)

	- 61.5	06000	272	,,,,,	ALF	20000
	į			A PARTY	į (
Natur Set WFI	1125	5186 W	MES.	1/200	7.00.	21860
	12800	\$ 00.	2/200	.05%	29600	\$087.
Freimen No. WF5- (5 (DUR. 16)	13200	50/0.	21600	+090-	2000	30.34
	13600	72/0.	22000	1590.	Jodes	.32%
Material 7475-77851 AL.	Moo	OMo.	22400	1070.	John	.36/8
	Mar	\$5/0.	22. Bro	20,	3/200	765.
Both Load Transfer 0%.	MBoo	¥1.10.	2320c	1280.	2/60	. +332
	1500	o%o.	23600	1680.	32000	1474.
Fastener MS 90353-08 (14 ma) RIVET	15600	9020.	24600	2960.	32600	.5/9
	16000	/220.	2042	2501.	32,000	072,
Are width	16400	£20.	24860	660/	5320-	629
	16000	.0263	25.200	2/1/26	33600	85%
Mr. Thuknoss	17200	+870.	25.600	8721.		
	17600	90%0.	26000	:/363		-
Spectrum F-16 400 HR	10000	550.	2660	2/5/		
	18400	1580.	26600	729/		
Max. Stress Level 34/55 (Gross)	1840	#\$0.	27240	2821		-
	17200	7650.	27600	. 1865		
Fathure Lite 33600 P.E. MAS. (4.21,1125)	1360	8240-	28000	,2057		
7	20000	6240-	2840	2812,		
Failure In Mole	20,60	.0 TRK	28,000	女52.		
•	-		ļ			

Crack Final HOLE

146E	158. 2871 1871	CRACK SIRED (EL.) , 50
8 U	2.080 €	NO FLAW

-Crock prymated in corner 0.093" from

NOTES

dimension in direction of

with regret to the surface

weink area from bore of O creek dimension

(2) All readings with

(3) Orginating in Cour.

(4) Readings dadgusted?

WFF-15(W) .1765 . 1678 30. .2564 182 .X173 1186 . 2010 782 392 500 2 .330 creat properties HOLE A 12000 32000 38 29600 27200 32400 23.20 X/Es 3560 202 300 0.035" from bare of bak reseat to the surface ans direction of CENER ./362 1283 , 1450 2 1881 1572 8251. area FRACTOGRAPMIC 2/60 28000 22400 23200 25600 28.00 2/20 2442 2660 27200 27600 28/10 3/200 22000 22/100 2400 25 600 26000 Countersank 2600 2600 127 2520 Couch organized in carner 413 D orginsting in CRACK (3) All centings 5186 O Creck 12800 Nores 16000 2400 13200 Man 1600 2000 7200 13600 3 6250 20400 1000 10000 15600 **168**0 3 20000 17600 340 17200 3760 FL. 100. (4.21ms) M590357-08 (40-A) KINET (822) Frost Promensions Fremen No. WET- 15 (DUA. 16) STEED (EL.) NO FLAW 1475-T7851 AL. NO PLAW F-16 400 HR 07. 3 Max. Strees Level 34KLS E.M. CRACK \$.080 B Both Load Transfer 各市 150 2.010 Crack ME. Thuknoss Fatzus Lite AVE. W. STh Speakum Test pate fastener Material Failure In Pata Sex 2797 4666 8 0 A-50

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MOTES

Finel Promensions

Crack

HoLE

SIEFO (EL.)

First Clerk

7616

O Grace dimension in direction of creat proposition

There is a crack 20.080 depth in econtersink area but a crack in the bore of the hole was read

8 <0.010 NO PLANS
C 0.036 NO PLANS
C 0.036 NO PLANS

A-51

APPENDIX B

FRACTOGRAPHIC RESULTS FOR MULTIPLE HOLE DOG-BONE SPECIMENS (Phase 1; Test Series I(b))

THE PLANT OF THE PROPERTY OF T

HOLE C. CERE 2186 crack Proposition WBI-1 (CT) 38 arno dimension in direction of CEARK 1/20 FRACTOGRAPHIC 13 E 0.0345 6.1924 0.2872 6.4327 6.3413 0.8264 6.1038 6.5076 6.54.52 CRACK 0.0804 d. 2331 8.052 0.0197 6.1541 5186 MOTES O Crace 37547 34 333 36.492 35477 33328 32273 6/14/16 29109 35965 28055 70164 500 31.219 1098€ 41.441 FIL his/\$07 Lives Fastaner 2590353-08 (14ma) RINET HOLE Crack Final Promensions Max. Strass Level 36.0 Ksi (Gross) Freemen No. WART- I (DUT. 15) 1475-T7851 AL 6. 7051 At toad Transfer 0% .3768" 3-19-85 Bomber 3.02 WBI 0.8264 1. A.B. Are. W. Sth 164 Me. Thuknoss Fatzus Life Speatrum Motorial Test pate Ferlune In Pata Set 2794 Ø U B-2

WBI-1(CS) CELLE PRIS HULP C 38 Store CENER 9815 FRACTOGRAPHIC ¥ ¥ 6.4433 20139 33320 0.0455 37507 B. 2499 2.0375 3 4383 0.0489 36572 6.1719 6.5079 35437 0.1077 4.337 41449 0. 7051 5186 32273 40500 38601 35968 41449 FE. hrs/3.07 L. ves Fastaner 10590353-08 (400) 61051 Freemen No. WBI-1 (ANT. 15) 7475-77851 Comber Mes. Stress Level 34.0 3.02 " At toad Transfer Ars. W.dth Path Set WAR 164 ME. Thuknoss B-3 Speatrum Motorial TEST pate Farlace In

dimension in direction of creat propostron

North O

Final Pimensions

Crack

4666

4 3791 GEE 1180 WBT - 2(4L) 38 River CRASK FRACTOGE APAIL F. 7. CAMER 0.0858 0.0157 1.0235 2.0346 0.0534 2186 0.0102 60024 4364 44736 39656 1501 40.500 44 739 FIF # 13.31 LIVES M5 90353-08 (400) FINEY Has. Street level 360Ksi. (Gregs) Mars Promensions Braber 7475-T7951 AL. Freemen No. 481-2 1005.17 Bot Load Transfer 07. "3778. Test cate 2-37-85 Pet Set WAI **18 t** Crack Fatzue Life Me. Thucnoss Material Are. 14.4Th Speatrum Fastener Failure In Hole

creek projection

Orack

dimension in

O Creek

MOTES

Find CRACK

2797

0.0858

2011

1. Th

3 Hole

0.0076

HOLE A VBI - 3(AL)

Test pate 2-27-85		! :						
	777	CRACK	727		l l	żż	CLACK	
Peter Set WBI	. Syr	2/86	* Age	1/80		18	2015	
	3/2/0	4.0134						
Specimen No. WAE -3(DUF. 18)	32273	32273 6.6318						
	33328	33348 6.0523						
Material 7475- T7851 AL.	34 383	34 383 8,683/						
	35437	35487 8.124						
Soft Load Treaster 0%.	26476	36.492 6.189						
	37547	37547 6.2483	1					
Frestoner Mes 90359-08 (Mana) River	38601	0.3426						
	39626	6.3984						
AVE. 4,476 3,0215"	40500	40500 6,472						
	41555	41555 6.5512						
Mr. There as s. 3759"	42609	42609 8.6811						
	43200	43200 6.8984						

43200FIthrs/3,20 Lives

Farlure In the

Max. Stress Level 34,0 456 (Gross)

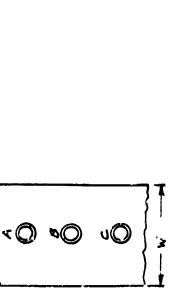
B-5

tine! Crack Hole

7516	F.MAK	CRACK SIZE (TU.)
	20.02	K1647
8	0.8984	0.7583
8	0.6431	0.6352
J	6.6437	20:000

O Crese dimension.

- W. W. W.



43200 Fil. hrs 13,20 Lives

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Falue In

Satyano Lite

Max. Smess level Blandsi (Gross)

B-6

Final Pimensions Cruck Hole

7797	KIND CRACK	CK SIERO (Fu.)
	16.27	16119
R	48680	0,7583
8	0.16437	0.4352
J	1 0027	000000

NoTES

coare proposition in direction ef dimension O crace

countersink at surface

Ø 18:0 Gere WBT - 3(BL) CENK F. KALTO S. K. A. P. MIC. 0.0383 1,2223 0.5447 1.3544 0.4557 5186 0.1593 6.2821 6.463/ 1.0902 0.1948 21.13 1.06 26475 33328 37547 34 363 55514 42609 32273 35487 35768 £0500 13200 3860! 53200 Elbha 13.20 Lives MS 10359-08 (Mara) FINET (6res) WBT . 3 (OUT, 18) 0% 7475-77851 Mes. Street level 36.0 Ksi . 3759 3.0215 Both Load Transfer MBI 东东 Secures No. Fatzuo Life. Me. Thusenoss Tass pate Dr. 14.011 Fastener Spectrum Farlure In Material 124 AS

B-7

MOTES

バル

Crack

Hole

274

direction of O Creek 0

countersink at sortace 450

2.7583 4.4362

488 G

E. Ø

0.6631

Ring CENCK 1/20 FRACTOGRAPHIC FE.7. 6. 3525 6.4252 33328 0.0542 6.5067 5186 5.2032 0.2233 0.6352 0.0121 6.0301 0.284 343830,0915 36 992 0.1621 354376.188 32273 14516 31218 60924 43700 39656 40,500 1537 1098: 43200FILT 13.20 LIVES MS 90359-08 (40 MA) RINET These Street Level 34.0Ksi (Gress) 7475-T7851 AL. Fremes No. WAE -3 (DUC. 18) 07. ,3759" 2.0215" Bembec 2-37-85 Both Load Transfer MBI 16 to **4 ()** Fatzana Life Me. Thuknow 185 Pate Ave. 14.5th Speakem Material 4 Pote Sex Fastener Failure

Ø

HOLE

WBT-3 (85)

Kel Transmission

CEOUR

38

HOLE CHECK Marel Promensions

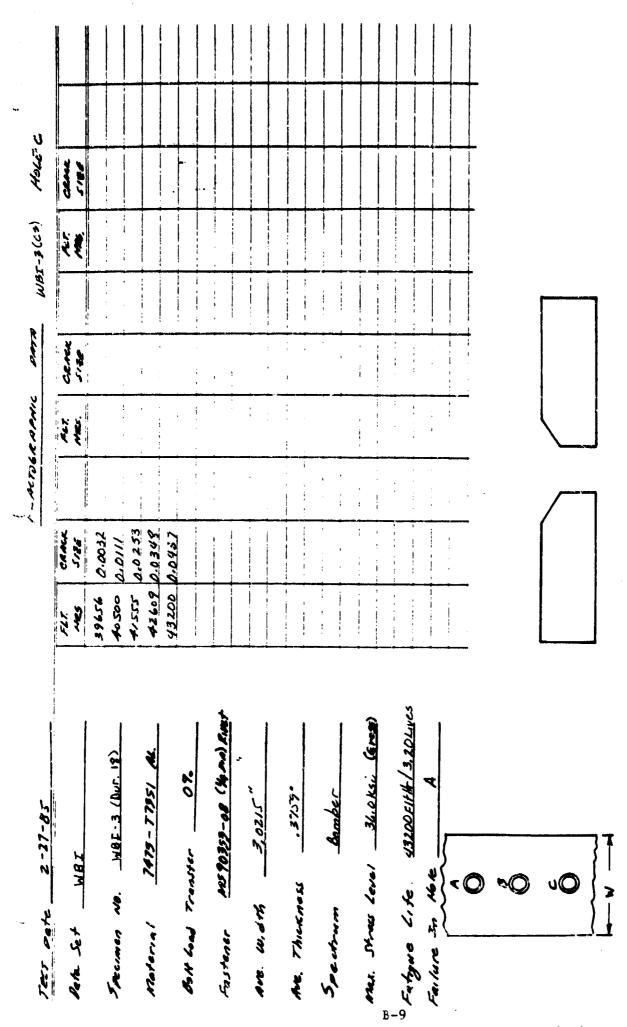
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		•	() () () () () ()
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MOTES

Octack dimension in direction of creak properties

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3 Out of undersal at surface



MOTES

Frost Promensions

Crack

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51200 (EU.)

CENCK

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746

2.75-83

0.635-2 0.0469 @

0.4631

0.0437

- Ocracs dimension in direction of crack proposto
 - @ out of countersink at surface

8 チャクト Core 2015 WAT-+(AL) 38 King Cerek + KACTOSRAPHIC 7 6.7 **3** 6.7 51186 1.0425 CAACK 1.0225 1.1234 2,2445 0.0086 1.0664 1.0894 0.1428 0.3875 67660 9,5369 1.5941 0.3031 161.0 49992 510+7 18937 रुष्ट 46828 45770 44719 47683 57/64 52101 23000 60125 58050 53156 M590359-08 (400) FLEET 5805 FIFE 14.30 LIVES (610.8) MBE-4 (DUC. 19) 07. 7475-77051 Mar. Stress Level 36.0 Lsi .8759" Ave. 41, 4th 3,0151" Bember Test pate 2-27-85 36H Load Transfer Pek Set MBE B-10 杨春 Me. Thuknoss Accomes No. Speatrum Fastener Material

The state of the s

A. - 4 d'a.

Crack Finel Pimensions Hole

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CRACK SIRED (EN.)	1100	16018	0.6647	00 +12005
First CR	4407	0.5941	4.7764	no Flams
2794		8	9	2

Proposition Creek dimension in direction of MOTES O Creek

HOLE Cere 2815 WBI-4181) ₹ 8 area CRACK 1130 FRACTOGRAPHIC ¥ 2.7 58050 0.7764 47883 0.0432 1.0958 489380.0457 0.1258 0.7246 CRACK 0.5262 4.1802 6.2591 1.344/ 6.0103 0.4/16 5186 46 828 0.023 1666 57164 55055 45773 52/02 53/56 5 4000 56109 2/047 Fatyus Lite. 58050EHHrs 14.30 Lives 2059-08 (400) KINET Max. Strass Level BluD 450 (Gress) Freemen No. WBI-4(ONE. 19) Notorial 1475-T7551 AL ,3759" 07. 3.0151" Bomber 2-27-85 Both toad Treatter MAI るみ ME. Thucsess Speatrum Are. W.dth Tast pate Failure In Park Set Fastener

Notes

O Crack dimension in direction of crack forposition

Finel Pimensions

Crack

4016

SIEFO (FL.)

ELLE CRACK

797

0.1091

0.2204

0

no Flaws

no Flaus

B-11

HOLE B GER 2186 W85-4(BS) ₹ 8 Dera CRACK 20/2 FRACTOGRAPHIC ¥ ¥ 6.64.92 6.6248 0.0347 8.0428 6.3259 0.4334 6.0202 0.2476 47883 0.0555 CKACK 8.00.8 0.1037 1.16.84 8170.0 5186 0.137 878 94 53.154 88681 25075 55055 45773 58050 76665 52102 24000 44719 54109 57144 58050 FIt. hrs 14,30 LIVES NO 90357-08 (40 AN) RIVET Max. Stress Level S4.0 KSL (Gress) Freemen No. WAT -4 (BUT. 18) 7475-T7851 AL. 22 Me. Thuknoss .3759" Ave. W. Sth 3.0151" Bomber Jest pate 2-27-85 Both Load Transfer ___ Rh. Set WAE 184 Fatzus Lite. Speatrum Material Fastener Failure In B - 12

The state of the s

THE PROPERTY AND PERSONS ASSESSED FOR THE PERS

Hole Crack Final Promensions

2794		Fines CRACK SIEED (EU.)
	16.57	10912
N	0.5941	1501.0
8	9.7704	2.87979
J	>6.014.00	W. 16.35

Notes

O Crack dimension in direction of crack tropys

WBT-5(ML) MAKE A Derra FRACTOGRAPAIC

The state of the s

一 一

0.3832 6.7159 6.0326 6.0633 4.1409 1.5005 6.0075 0,0475 6.1225 0.1551 16.0191 1,1398 1831 8.1046 0.3111 0.092 0.22 37547 26.432 78864 5/875 60920 4364 45773 16828 47883 35437 47.19 18987 35496 100 K 51047 2000 1098€ 51975 FIL. WS 13.85 Fustaner 10590359-08 (40-01) Evert Max. Strass Level 36,0 ksi (Grass) Freemen No. WBI-5(Dur. 20) .3752" 3.0063" Notorial 1475-T7851 2-27-85 Box toad Transfer UBL 18 A Fatzue Lite Mr. Thuknoss Ave. W.dth Test pate Speatrum Failure In 8h hr

CELUL \$ \$ AE.

> Finel Pimensions Crack 4666

B-13

2797	16. MOL.	CRACK SIZ	SIECO (ELL.)
	4427	K1611	4
N	2.7159	6.5	2886
8	0.1866	0.144	745
Ü	678810	1510	//

NOTES

dimension in direction of creat propostor O creek

Hole Crack Front Promensions

1466	Finak	CRACK	512.0 (Ev.)
	427		R1647
N	9.512.6		0.5586
8	0. 1861	6	0.1465
J	1880	3	0.1411

O Grace dimension in direction of

¥ 70

UQ)

Ø HOLE CLOCK MBE - 5 (8T) રું 👸 See Cerek FRACTOSRAPHIC ¥ £ 1.0775 1,0014 0.0075 18200 4.1437 11846 2815 16401 7.1094 5/047 49972 76828 18937 45770 47833 44719 5/875 51975FIH 13.85 Lives Frestense 10 90359-08 (16 ma) Roses Max. Straw Level 34.06si Grego Freemen No. WAT . 5 (047.20) 07. 7475-77851 ME. Thickness .3752" Ave. W. dth 3,0063" 2-27-85 BA tod Treaster Pet Set WAI 3 Speatrum Fatzono Lite. Test pate Material Failure In

バル・ Crack HOLE

> |

B-15

4 4 9 9	2747	First CRACK	"
		4000	KIENT
	8	0.7159	98851
	0	0.1866	0.1465
	C	6.3849	11110

in direction of Mares O Creek

WAT-S(CL) HOLE C 3 1100 58 King FRACTOGRAPHIC 3 8 0.3849 9.04.96 6.1043 8.1375 8.0226 0.2374 6.3267 1.0397 1001.0 21/26 6.1421 0.2771 A.000 42609 18937 21975 46828 1997Z 40 Sac 4577 5/47 4364 47883 55514 44379 51975 FIFTE 5/3.85 LIVES M5 90359-08 (44-4) Kites (6,05) WBE-5 (Our. 20) 1415-T7351 AL. Max. Straw Level Bunksi .3752. 3.0063" Bomber 2-27-85 Both Load Transfer 16 to ME. Thuknow Fatzywa Lite Test pate Specimen No. Are west Speatrum Fastener Material Failure In Pet 5et

Sales of the sales

51860 (EL)

Fine CRACK

7976

8 0 U

12021

HOLE CMCK

4.5886 8.1465 2.1911

2.3849 d. 18466 0.7159

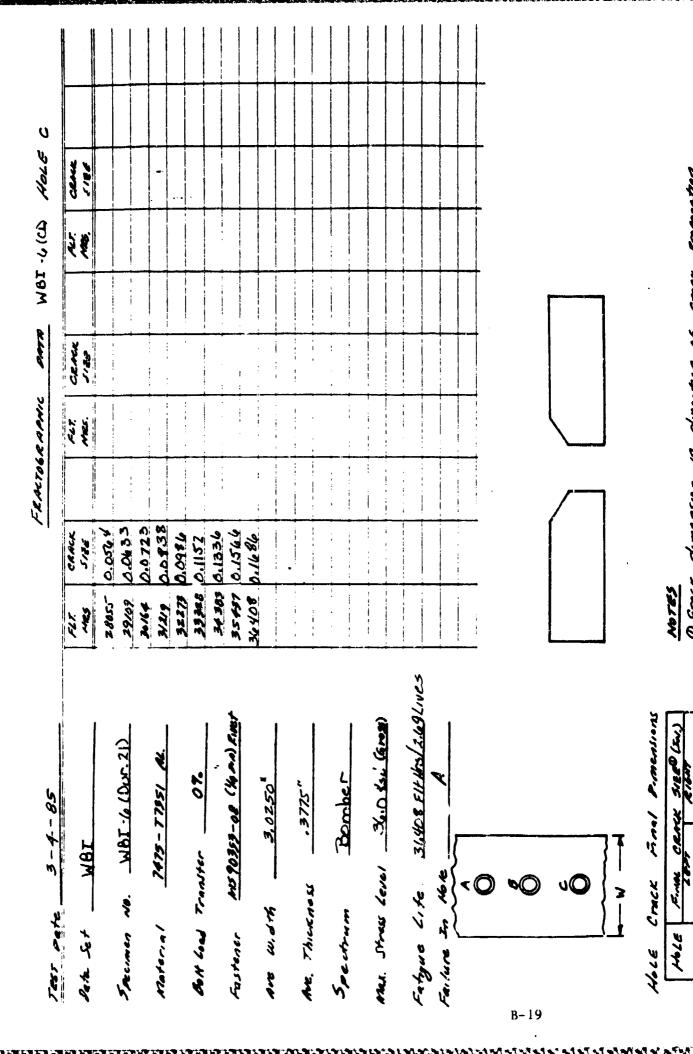
Crack direction of Mores O Crece

B - 16

Natures No. WBI-6 (DUC.21) Notorial 7479-77851 AL.	9 /4/5 9 /4/5 3 /2 /3 3 /2 /3 3 /2 /3 3 /2 /3 3 /2 /3	CANCK 5.00.3/ 0.0105 0.0181 0.0386	j j j	Carre	38	7.44¢	
Fastaner 10 90359-08 (14 ma) River	3543)						
Mrs. W. oth 3.0250". Mrs. Thukness .3715". Speatrum Bomber							
Max. Three level Hubbsi Grew. Forgus Life Hubbettliablives Forlure In the A							
R-17					***************************************		
Hole Crack Final Propertions Hole Final Cent Stee (tr.) A 0.3775 @ no Flaw C 0.1686 no Flaw	Mores O Crece O Distan	g å	bole p	of tall	משמב למקשק	yerten	

7 HOLE EE 2/80 WBI - 4(85) \$ 8 CACK @ Dostance through hole pius Flaw at Facture Rivo CRACK FRACTOBRAPHIC dimension 8,0000 CRACK 0.0153 4.0324 8.000 0.0816 6.1145 34383 8.0451 O Creek 36 408 Nores 33326 35437 32273 **/* 31.219 34408 FIt best 1.69 Lives M590353-08 (4mm) RIET Crack Final Pimensions Mex. Stress level 34.0 KSL (Gross) SIEED (EL.) MBI - 4 (DUC. 21) 3-4-65 7475-T7851 AL. 2,1175 07. "2775" £.0220. Bember Fine Cent 0.3775 6 Both Low Transfer MOI 0,1143 16 to Me. Thickness Fatzue Life Freemen No. are w.dth Jest rate Spectrum Fastener Failure In Pata Set Material 2794 4016 0

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@ Measurement is distance through the hole plus thew at Failure

320

direction of

bore at 0,4215" From other orde of hole

Flaw contacts

O Crack

no Flaw

0.3775

16ce A GERE 2116 CONTR WBT-7(AL) 38 CRACK FRACTOSRAPAIC 7 7 7 X 5.3763 46034 0.3277 CKACK 1.1543 6.2522 0.0202 0.1373 37547 0,0046 2,0545 8011.8 18878 0.1824 6.4441 8.078 0.205 6.237 3186 5/047 42609 46828 49992 £0500 18937 54401 33968 55514 1577 47883 4384 38601 4114 52156 10125 SULDI FIT his/4,04 LIVES MS 90359-08 (40-10) RINET Max. Stress level 3400 Ksi (Gras) WBI - 7 (DUC, 22) 3-4-85 07. 7475-77851 3.0163" Bomber Both Load Transfer W.B.F 16/2 Me. Thuknoss Fatzue Life Specimen No. Ave w. 4th Spectrum Test pate Failure In Fastener Pata Set Material

200

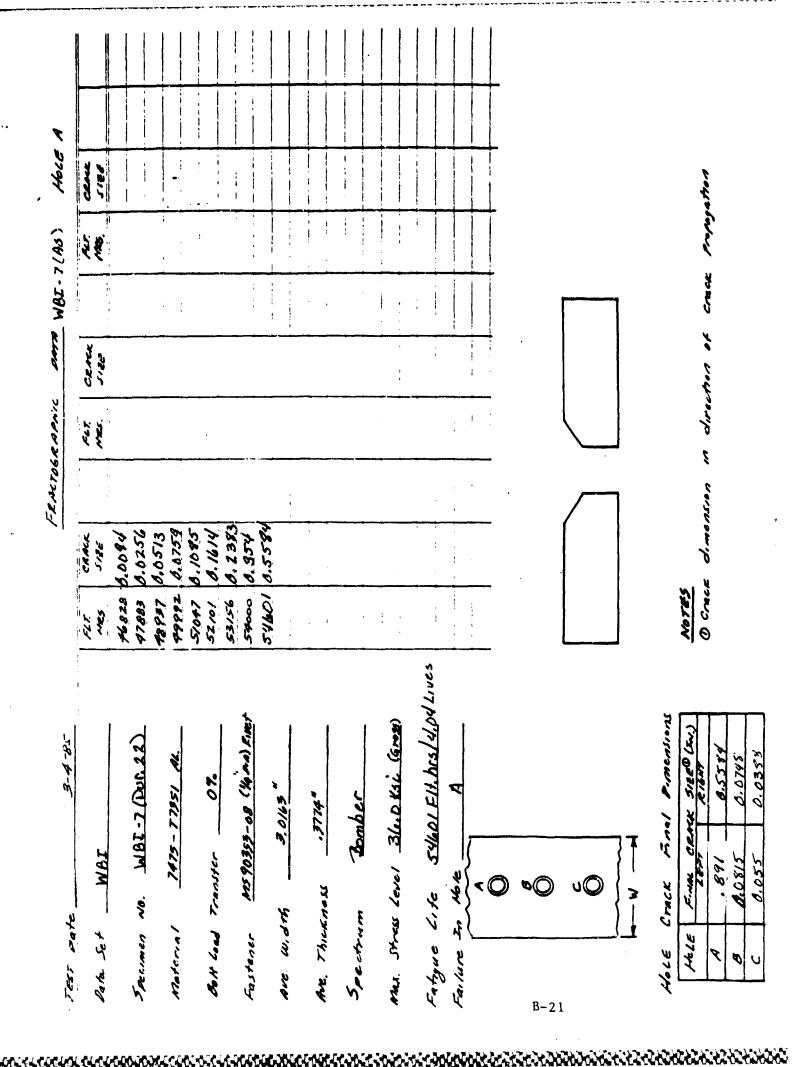
Finel Pimensions Crack 4016

B-20

161E	F.MAL CRA	G. MAL CRACK SIRED (EN.)
	16.27	1197
A	158'9	0.5584
B	2/800	6,0748
ر	0.055	885.0

direction of O Creck

NoTES



2.0034 2.0034 2.0034 2.00492 3.00492 4.0875 4.0875	lest pate 3-4-85			THE WAR	Man .	M&I - 7 (8L)	HOLE	8	
1	12 × 23	17.	5815 5186	/6.7.	CRACK	5.4	Cene		
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1. det 30/18° 2. det 54/20/200/200 2. det 54/20/200/200 2. det 54/200/200 3. det 54/200 3. det	1475-17851	53/56	20208						
# Transfer 0% # 1870319-08 (Man) sum # 20163" # 18704		54401	4.0815						
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2. 166									
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Crack Final Financians Crack Final Financians Crack Final Financians 6.881 6.55-54 6.0815 6.0148 6.085 6.0288)								
Crack Final Financians Crack Final Financians (c. 881	J								
Crack Final Promentions Le Film Center State City.) 1.891 0.55-84 0.0815 0.0388	1								
	Crack Finel 6 Fine Cente 6.89/ 6.08/5 4.055	Mores O Creek	dimension	_	50 V.	3 3	* to t		

HOLE C Clerk WBI-7(CL) ₹ ₹ Rest CRACK FRACTOGRAPHIC 3 8 MOTAS Ocrees dimension 4.0087 1.0157 1.0259 0.0046 1,0357 0.055 73864 57000 95185 51047 52101 54601 NO 90359-08 (M. M.) KINST Max. Stress Level 34.0454 (Greg) Finel Fimension 51200 (EL) 5440151111-14.04 Freemen No. WAE-7 (DW. 32) 7475- T7951 AL. Both Load Transfer 0%. 3.0163" Finds CRACK Path Set WBE Crack Fatyus Life Me. Thuknoss Test pate Ave. 14.4Th Material Speakum Fastener 7416 Hole B-23

3

0.5584

0.391

0.0748 8860

* FELE 2186 GER (74) 8 - 38M 7. 18. erna FRACTOGRAPHIC 0.0136 9.1482 36 492 4.2334 37547,0,2846 18800 0.35 74 78100 4.0055 6.0244 0.0672 35487 0.1924 6.04// 21.86 0.11 34 303 33328 27000 28055 75197 37979 32273 29109 79/06 31219 37979 FIF Hr / 2.81 LIVES MS 90353-08 (16 MA) FIRET Mas. Stress level 36:0 ksi (Gross) MBI = 8 (DUC. 23) 7475-77851 AL. 3.0175" ,3736" Both Load Transfer MBI Fatzue Lite. Me. Thuknoss Specimen No. Test pate are width Speakum Fastener Failure In Pata Set Material B - 24

O Grace dimension in direction of

5/200 (EL)

Eine CENCE

7416

1502

Crack

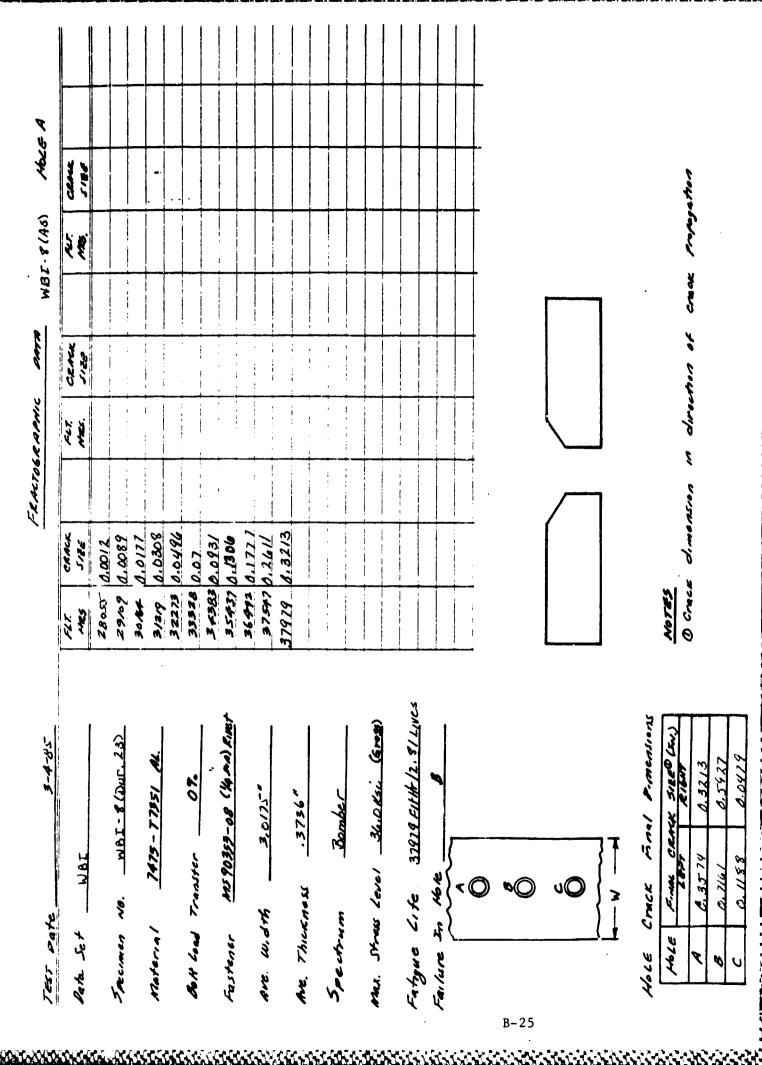
4066

0.5927

0.3213

0.3574

8



	3		
Max. Stress level 34.0 ksi. (Grog) Fatgue Lite 31979 FII, his 2.81 Lives Failure In the B			

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Hole Crack Finel Pimensions	-10. WBL -20.00.23	-10. WBM10. WBM12. WBM1	160 - 100 -
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1.010 9 1.01 | MOL - 8 (Nor. 13) 20.05 1.010 9 1.015 1.010 9 1.01 | MOL - 8 (Nor. 13) 20.05 1.010 9 1.015 1.010 9 1.01 | MOL - 8 (Nor. 13) 20.05 1.010 9 1.015 1.010 9 1.01 | MOL - 8 (Nor. 13) 20.05 1.010 9 1.015 1.010 9
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 | 160. WASE -8 DOS 23 2909 12199 2909 12199 2909 12199 2909 12193 39044 1053 39050 1009 30000 10 |
| 127 | 16. WELL 16. WELL 16. WELL 16. WELL 16. State 16. | # # # # # # # # # # # # # # # # # # # | ## ## ## ## ## ## ## ## ## ## ### ### | -10. WBL -8 (Nor. 13) -10. NBL -8 (Nor. 13) | 1619 - 1600 - 23 | 1612 - 8 (200, 23) 25005 2,0109 25005 2,0109
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2000 10019 2000 | 1672 - 2 (200, 23) 1673 - 77951 AL 2000 10019 2000 | 1672 - 2 (200, 23) 1673 - 77951 AL 2000 10019 2000 | 1672 - 2 (200, 23) 1673 - 77951 AL 2000 10019 2000 | 1672 - 2 (200, 23) 1673 - 77951 AL 2000 10019 2000 | 1672 - 2 (200, 23) 1673 - 77951 AL 2000 10019 2000
10019 2000 | 1672 - 2 (Mar.) 1233 | 1672 - 2 (Mar.) 1233 | 1672 - 2 (Mar.) 1233 | MOL -8 (Nor. 23) 2005
 | 1479-7795/ AL. | 1479-7795/ AL. | 1479 -77951 AL. 25005 610109 7700161 -8 Poor 133 7700161 -8 Poor 1 | 1479 - 77951 AL 1232 7479 - 777951 AL 1233 7479 - 777951 AL 1233 7479 - 777951 AL 1237 7479 - 777951 AL 1257 | 160 MBL -8 Duc. 23 250 50009 2500 60009 2500 60009 2500 60009 2500 60009 2500 60009 2500 60009 2500 60009 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 25000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 25 | 160 MBL -8 Duc. 23 250 50009 2500 60009 2500 60009 2500 60009 2500 60009 2500 60009 2500 60009 2500 60009 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 25000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 60000 2500 25 | 181 -8 Duc. 23 22005 60009 22005 60009 2200 1.0.199 2004 | 181 -8 Duc. 23 22005 60009 22005 60009 2200 1.0.199 2004 | 10 10 10 10 10 10 10 10
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| | ## WEST | WBA WBA - 8 | MBA | ## ## ## ## ## ## ## ## ## ## ## ## ##
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250-55 620109 250109 | 1479—77757 dt. 1232 | 1479—77757 dt. 1232 | 1881 - 8 (Duc. 23) 28055 6.01/19 2949 6.01/19 | 10 10 10 10 10 10 10 10
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22005 2 | 1679 - 7795 44 2000 23 2000 | 1619 - 17195 44, 2055 120109 2905 120109 2905 120109 2905 120109 2905 120109 2905 120109 2905 120109 2905 200109 2905 200109 2905 200109 2905 200109 2905 200109 | 1612 - 4 (Dur. 23) 226.05 6.00109 200.00 1 1.00 19 2.00 10.0 | 1612 - 4 (Dur. 23) 226.05 6.00109 200.00 1 1.00 19 2.00 10.0 | 160 WBT -8(Dur. 23) 28055 600109 28055 400109 28055 400103 3044 40352 3055 400103 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09 (4000) 61005 3055 -09
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| 3 | WBA WAS -8 (Doc. 23) 230.05 1.00.09 1.00.09 1.00.00 1.00.09 1.00.00 | 100 MBL -8 (Don 13) 100 - 8 (| WBA | # Max -8 (Dec. 13) 29.05 1679 - 7775 44, 29.07 1679 - 08 (Month Line) 1579 20.05 1 | Mar - 8 (Dec. 23) 23 oct 1.05
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| 3 | WBL WBL -8 Doc. 23 28655 6,0109 28655 6,010 | MBL -8 Doc. 13 2865 60009 1000 | MBL -8 Doc. 13 28655 60009 1865 | MB1 -8 Doc 23 2865 6,009 4619 461 462 461 462 461 462 461 462
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| υ © { } | MBL -8 Duc 23 28-55 60.009 10.009 | MBL -8 Duc 13 28 cs 6,0009 10 | MBL -8 Duc. 23 28 cs 60009 18 cs 60009 | MBL -8 Doc. 23 28-55 60.009 Mas. 1885 1885 1873 - 7795 M. 28-55 60.009 28-55 60.009 1873 - 7795 M. 28-55 60.007 | MBL - 8 (Dec. 23) 28 o.5 (Del) 29 o.5 (Del) | MBL - 8 (Nor. 13) 28 o.5 (Mol. 199 Mas. 120 | MBL - 8 (Nor. 13) 28 o.5 (Mol. 199 Mas. 120
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\text{\Partial} \text{\Que} \\ \text{MOL} - \text{\Que} \\ | 7475 - 7755 / 4. 320% 1.0199 7475 - 7755 / 4. 320% 1.0199 7475 - 7755 / 4. 320% 1.052 90359-08 (48 m) 6180 / 3552 6.099 3 0175 " 35 |
| 20 | 1885 - 8 Doc. 13 2805 5,0109 | 1885 -8 Doc. 23 2805 5.0109 | MBL -8 (Dur. 23) 2805 0.0109 2805 0.0109 2905 0.0199 2006 0.023 2006 0.023 3006 0.023 3007 0.038 3007 0.038 3007 0.038 3007 0.0182 3007 0.038 3007 0.0182 3007 0.038 | 1054 And Silver And State And
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 | 185 -8 (200.23) 29.09 (2019) 4.0. 1.0. 1.0. 1.0. 1.0. 1.0. 1.0. 1.0. | 185 -8 (200.23) 29.09 (2019) 4.0. 1.0. 1.0. 1.0. 1.0. 1.0. 1.0. 1.0. | 185 -8 (200.23) 29.09 (2019) 4.0. 1.0. 1.0. 1.0. 1.0. 1.0. 1.0. 1.0. | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 101 -8 (Duc. 23) 29.09 (La199) 29.09 (La199) 29.09 (La199) 29.09 (La193) 29.09 (Lan) Energy 29.09 (Lan) Ener | 2805 6.0109 2805 6.0109 2805 6.0109 2909 6.0199 2004 6.032 3007 3007 3007 3007 31979 6.5921
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 | 2805 6,0109 2805 6,0109 2805 6,0109 2909 6,0199 3004 6,052 3007 35273 6,0123 3,007 6,0123 3,007 6,0123 3,007 6,0127 3,007 6,0127 3,007 6,0127 3,007 6,0127 3,007 6,0127 | 2805 6,0109 2805 6,0109 2805 6,0109 2909 6,0199 3004 6,052 3007 35273 6,0123 3,007 6,0123 3,007 6,0123 3,007 6,0127 3,007 6,0127 3,007 6,0127 3,007 6,0127 3,007 6,0127 | 2805 6,0109 2805 6,0109 2805 6,0109 2909 6,0109 3007. 3007. 35273 6,01338 35973 6,1338 35975. 37979 6,5922 | 2805 6,0109 2805 6,0109 2805 6,0109 2909 6,0109 3007. 3007. 35273 6,01338 35973 6,1338 35975. 37979 6,5922 | 28055 6,0109 2805 6,0109 2909 6,0199 3004 6,032 3,075" 3,075" 3,075" 3,075" 3,075"
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| 1evel 34.0 ksi (6mg) 1evel 34.0 ksi (6mg) 1evel 31919 Elt. hrs. [2.91 t.wes] 1evel 31919 Elt. hrs. [2.91 t.wes] 1evel 31919 Elt. hrs. [2.91 t.wes] 1evel 34.0 ksi (6mg) | WBI -8 (DOC. 13) 2805 6,0109 2805 6,0199 2909 6,0524 3203 6,099 3205 6,099 3205 6,099 3205 6,099 3205 6,099 3205 6,099 3205 6,099 3205 6,099 3205 6,099 3205 6,099 3205 6,099 32075 6,099 | WBT -8 (Duc. 23) 280-50 6,0109 280-50 6,0109 290-50 6,0199 300-77851 (4. 3223 6,0123 320-50 (4,000) 6,000 | WBT -8 (Duc. 23) 280-50 6,0109 WBT -8 (Duc. 23) 290-9 6,0199 300-77851 (4, 3223) 3223 6,0193 3223 6,0123 32075" 32075" 32075" 337979 6,5927 337979 6,5927 | MBI -8 DOC 13 2909 4.0199 WBI -8 DOC 13 2909 4.0199 JATS-77851 M. 3203 4.0524 Sept. 1338 590359-08 (Mona) Emet. 1.182 3.01.5" 3.01.5" 3.1979 6.5927 3.1978 6.5927
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 | 7675 - 7735/ AL 3205 6,0109 7675 - 7735/ AL 3205 6,099 7675 - 7735/ AL 338 79359 - 08 (4,0.4) Eller 3 2/75 | 2805 62009 (12) 2805 62009 (12) (12) (13) (13) (14) (15) (15) (15) (15) (15) (15) (15) (15 | MBI -8 Dor. 13) 29.09 1.0199 7675 - 77551 M. 32273 0.094 35273 0.094 35520 0.094 35521 0.1938 35521 0.1912 3075" 37479 0.59127 | 2805 6,0109 2805 6,0109 2909 1,0199 3044 6,033 3044 6,033 3199 6,0133 3075" 3075" 31979 6,5927 31979 6,5927 | 2805 6,0109 2805 6,0109 2909 1,0199 3044 6,033 3044 6,033 3199 6,0133 3075" 3075" 31979 6,5927 31979 6,5927
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| 1evel 34,0 ksi (6mg) 1evel 31919 Elt. hrs. [2.8] Lives 6 6 6 7 6 7 8 8 9 9 10 10 10 10 10 10 10 10 | WBI -8(Dur, 13) 2805 6,0109 WBI -8(Dur, 13) 2909 6,0199 3044 6,033 3,015 | WBI -8 (Dor. 13) 2805 6.0109 2805 6.0199 2909 6.0199 2904 6.033 2909 6.0524 32273 6.0524 32273 6.099 3.075" 3.075" 3.075" 3.075" 3.075" | WBI -8 (Dur. 13) 2805 6,0109 2805 6,0109 2909 1,0199 3004 4,035 3,075" 3,075" 3,075" 3,075" 3,075" 3,075" 4,0127 | MBI -8(Duc, 13) 2805 6.0109 WBI -8(Duc, 13) 2909 6.0199 3004 6.052 3007 6.099 3223 6.099 3223 6.1338 3205 6.099 3205 6.099 3205 6.099 3205 6.099 3205 6.099 3205 6.099 3205 6.099
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 | 1615 -8 (Dur. 13) 2805 6.0109 2805 6.0109 2909 4.0.199 3044 6.052 3044 6.052 3.015" 3.015" 3.015" 3.015" | 1615 -8 (Dur. 13) 2805 6.0109 2805 6.0109 2909 4.0.199 3044 6.052 3044 6.052 3.015" 3.015" 3.015" 3.015" | 1615 -8 (Dur. 13) 2805 6.0109 2805 6.0109 2909 4.0.199 3044 6.052 3044 6.052 3.015" 3.015" 3.015" 3.015" | 1615 -8 (Dur. 13) 2805 6.0109 2805 6.0109 2909 4.0.199 3044 6.052 3044 6.052 3.015" 3.015" 3.015" 3.015" | 1615 -8 (Dur. 13) 2805 6.0109 2805 6.0109 2909 4.0.199 3044 6.052 3044 6.052 3.015" 3.015" 3.015" 3.015"
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| 1evel 34.0 ksi (6mg) 1evel 34.0 ksi (6mg) 1evel 31919 Elt. hrs. [2.2] t. wes 1evel 32919 Elt. hrs. [2.2] t. wes 1evel 34.0 ksi (6mg) 1evel 34.0 ksi (| MBI -8 Dur, 13) 2805 6,0109 2805 6,0199 2805 4,0199 3044 4,035 3956 4,099 3957 6,099 35677 6,1338 35677 6,4227 3777 6,4227 3777 6,4227 | WBI-8(Dur. 13) 2805 6.0109 WBI-8(Dur. 13) 2909 6.0199 3044 6.033 1475-77851 44. 3223 6.1038 3559-08 (4,00) fuer 3559-08 (4,00) fuer 3559-08 (4,00) fuer 3559-08 (4,00) fuer 35797 6.4227 35796" 37796" | WBT -8 (Duc. 13) 2805 6.0109 2805 6.0109 2909 6.0199 3044 6.033 3044 6.033 31979 6.0123 3005" 31979 6.5927 31979 6.5927 | MBI -8 (Dur, 13) 2805 6,0109 2805 6,0199 3044 6,035 3044 6,035 31879 -08 (4,00) funt 35075" 37979 6,927 3,075" 37979 6,5927 | MBE-8 (Dur, 23) 2805 6,0109 2805 6,0199 3044 6,033 3044 6,033 31879 -08 (4,04) funt 35075" 37979 6,5927 3,075" 37979 6,5927
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3007 0.099 | 7675-7735/ 29kg 1.0199 7675-7735/ AL. 30044 1.033 7675-7735/ AL. 32373 0.0723 32373 0.099 54389 0.1338 35577 1.4127 3774" 37779 0.5927 | 7675-7735/ 29kg 1.0199 7675-7735/ AL. 30044 1.033 7675-7735/ AL. 32373 0.0723 32373 0.099 54389 0.1338 35577 1.4127 3774" 37779 0.5927 | 7675-7735 | 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7477 - 7735/ 4. 7477 - 7735/ 4. 7477 - 7735/ 4. 7477 - 7735/ 4. 7477 - 7735/ 7. 7477 - | 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 4. 7475 - 7735/ 7. 7475 - 7735/ 7. 7475 - 7735/ 7. 7475 - 7735/ 7. 7475 - 7735/ 7. 7475 - 7735/ 7. 7475 - 7735/ 7. 7475 - 7735/ 7. 7475 - 7735/ 7. 7475 - 7735/ 7.
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6.1338 3543 6.1338 3543 6.135 3547 6.4127 3776 8.5923 |
| Fember 1:00 340 ksi. (6mg) 1:00 32029 Elt. hos [2.8] Lives 00 00 00 00 00 00 00 00 00 00 00 00 00 | WBE-8 (Duc. 13) 2909 | WBE-8 (Duc. 13) 2909 | WBE -8 (Dur. 13) 2805 6,0109 2805 6,0109 3044 6,032 35275 6,099 35275 6,099 35275 6,1338 3557 6,1352 3557 6,1352 35757 6,4127 | MBE-8 (Duc. 13) 2909 | MBI -8 (Dur. 13) 2505 6,0109 2505 6,0199 3044 6,052 35075 4,1338 56972 6,1338 35075 3557 6,4127 31979 6,5917 | 165 - 8 Dur. 13) 2909 | 165 - 8 Dur. 13) 2909 | 165 - 8 Dur. 13) 2909 | MBI -8 (Dur. 13) 2505 6,0109 2505 6,0199 3044 6,052 35075 4,1338 56972 6,1338 35075 3557 6,4127 31979 6,5917 | 165 - 8 Dur. 13) 2909 | 1615 - 8 Dur. 23 2909 | 1675-77951 de. 28055 6,0109 2805 6,0199 2909 6,0199 3,0175" 3 | 7675-77951 AL 33223 6,0099 7675-77951 AL 3323 6,00723 590359-08 (4,00) 6,007 3,0075" 3,0075" 3,0075" 3,0075" 3,0075" 3,0075" 3,0075" 3,0075" | 7675-77951 AL 33223 6,0099 7675-77951 AL 3323 6,00723 590359-08 (4,00) 6,007 3,0075" 3,0075" 3,0075" 3,0075" 3,0075" 3,0075" 3,0075" 3,0075" | 2805 6,0109 2805 6,0199 2909 6,0199 3,0175 4. 3,213 6,0123 3,2175 6. 3,2175 6.1338 3,2175 6.1352 3,2175 6.1352 3,2175 6.1352 3,2175 6.1352 3,2175 6.1352 3,2175 6.1352 | 7675-7795/ AL. 3.0775" 3.077 | 7475 - 7795/ 4. 7475 - 7795/ 4. 7475 - 7795/ 4. 7475 - 7795/ 4. 7475 - 7795/ 4. 7475 - 7795/ 4. 7559 - 08 (4,0.0) film; 769359 - 08 (4,0.0) film; 76 | 7475 - 7795/ 4. 7475 - 7795/ 4. 7475 - 7795/ 4. 7475 - 7795/ 4. 7475 - 7795/ 4. 7475 - 7795/ 4. 7559 - 08 (4,0.0) film; 769359 - 08 (4,0.0) film; 76 | 7475-7795/ 4. 7475-7795/ 4. 7475-7795/ 4. 3044 4.033 3.075" 3. | 7475-7795/ 4. 7475-7795/ 4. 7475-7795/ 4. 3044 4.033 3.075" 3. | 2805 0.0109 2805 0.0109 2909 0.0199 3044 0.033 30175" 30175" 31979 0.5523 31979 0.5523 | 2805 6,0109 2805 6,0109 2909 6,033 3007 3007 3007 3007 31979 6,5922 |
| 1016 34.0 ksi (6102) 1016 34.0 ksi (6102) 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | WBI -8 Dur. 13) 29.09 | WBI -8 (Duc, 13) 2805 6,009 2805 6,019 3044 6,032 3044 6,032 31879 0,012 3,0175" 337979 6,5917 | MBI -8 (Duc, 13) 2905 6,0109 MBI -8 (Duc, 13) 2909 6,0199 3044 6,032 Her OT. 3,0175" 33979 6,1338 35970 6,1352 3,0175" 3,0175" 3,0175" | WBI -8 Dur. 13) 29.09
 | WBI -8 (Duc. 13) 2805 6.0109 2805 6.0109 3006 6.033 3007 | 7475 - 77851 AL. 250.59 | 7475 - 77851 AL. 250.59 | 7475 - 77851 AL. 250.59 | WBI -8 (Duc. 13) 2805 6.0109 2805 6.0109 3006 6.033 3007
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| 1011 -3726" Tember 1cre 34.0 ksi (6008) 1cre 3299 Ells hes [2.8] Lives 1cre B 1cre | 2805 5186 me. 1126 me. 2805 2805 51009 2909 2909 2909 2909 2909 2909 2909 | 2805 5186 me. 1186
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 | 2805 <u>6,0199</u> 2909 <u>6,0199</u> 3044 <u>6,052</u> 31273 <u>6,0572</u> 4 32273 <u>6,099</u> 35529 <u>6,1338</u> 35547 <u>6,4127</u> | 28055 <u>6,0109</u> 2909 <u>6,0189</u> 3044 <u>6,0552</u> 3137 <u>6,0572</u> 4 32273 <u>6,099</u> 35529 <u>6,1338</u> 35547 <u>6,4127</u> | 28055 <u>6,0109</u> 2909 <u>6,0189</u> 3044 <u>6,0552</u> 3137 <u>6,0572</u> 4 32273 <u>6,099</u> 35529 <u>6,1338</u> 35547 <u>6,4127</u> | 2805 6.0109
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| 1011 -3736" Tember Tember 34,0 ksi (6002) Te 33919 Elt. hrs. [2.2] Lives More B O O O O O O O O O O O O O | 28055 5.006 Mee. 1122
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29,09 6,0189
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35320 6,099
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35528 6,099
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3553 6,1338
3557 6,1752
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3557 6,1752 | 2805 2,0109
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 | 2805 60109
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33328 6.089
54383 6.1338
35473 4.4227 |
| 10-15 - 5726" Tember 10-10 34.0 ksi (6102) 10 32929 Elit hos [2.2] Lives 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 2805 5.006 mes. 1100
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3044 6.052
3137 6.052
33526 6.099
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5533 6.1338 | 2805 6009
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5533 6.1338 | 2805 6009
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3532 6,099
3532 6,1338
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 | 2805 6,0109
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35273 6,0723
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3137 6,0524
32273 6,099
3553 6,1338
3553 6,1338 | 2805 <u>0.0109</u> 2805 <u>0.0109</u> 2909 <u>0.0199</u> 3044 <u>0.0552</u> 31273 <u>0.072</u> 3 33528 <u>0.089</u> 5437 <u>0.1752</u>
 | 28055 <u>6,0109</u> 2909 <u>6,0199</u> 3044 <u>6,0524</u> 32273 <u>6,05724</u> 32273 <u>6,05724</u> 35528 <u>6,1338</u> 7 35437 <u>6,1752</u> | 28055 <u>6,0109</u> 2909 <u>6,0199</u> 3044 <u>6,0524</u> 32273 <u>6,05724</u> 32273 <u>6,05724</u> 35528 <u>6,1338</u> 7 35437 <u>6,1752</u> | 28055 <u>6.0109</u> 2909 <u>6.0199</u> 3044 <u>6.0524</u> 32273 6.0999 5437 6.1338 | 28055 <u>6.0109</u> 2909 <u>6.0199</u> 3044 <u>6.0524</u> 32273 6.0999 5437 6.1338 | 2805 6.0109
29.09 1.0.189
30.44 1.0.33
31.29 1.0.524
3223 0.0723
35526 0.089
5593 0.182
26973 0.1752
 | 2805 0.0109
29.09 0.0189
30.44 0.033
31273 0.0723
35528 0.099
35538 0.099
35537 0.182 |
| 15726" Thember 1500 3410 ksi (4002) 1500 214 hrs. [2.2] Lines 1500 214 | 2805 6,009
2805 6,009
2909 1,0199
3000 1,033
3223 0,099
35328 0,099
3593 0,1338
3593 0,1338 | 2805 5186 me. 1186
2805 6.0109
2909 6.0199
3044 6.033
31273 6.0723
35273 6.089
3593 6.1338 | 28055 5186 mes. 1186
28055 51009
2909 1.0189
3044 1.033
3223 0.0723
3523 0.099
3583 0.1338
35973 0.1852 | 2805 6.009
2805 6.009
2909 6.033
3000 6.033
31273 6.0524
32273 6.099
35938 6.1338
35937 6.1872 | 2805 6009
2805 6009
2909 6033
3044 6033
3044 6033
31273 60723
35273 6099
3593 61338
3593 61338
 | 2805 6009
2909 1.0189
3044 1.033
31273 0.0723
33326 0.089
5439 0.1838 | 2805 6009
2909 1.0189
3044 1.033
31273 0.0723
33326 0.089
5439 0.1838 | 2805 6009
2909 1.0189
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31273 0.0723
33326 0.089
5439 0.1838 | 2805 6009
2805 6009
2909 6033
3044 6033
3044 6033
31273 60723
35273 6099
3593 61338
3593 61338 | 2805 6009
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33326 0.089
5439 0.1838
 | 2805 6.0109
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35937 0.1812
35973 0.1872 | 2805 6.0109
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35936 0.0999
35937 0.1812
35973 0.1872 | 2805 6.0109
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35937 0.1812
35973 0.1872 | 2805 6.0109
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2909 6009
2909 6003
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32593 6.1338
35593 6.1338 | 2805 6009
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5-583 6,1338
3557 6,1812
3557 6,1812 | 2805 <u>0.0109</u> 2909 <u>0.0109</u> 2909 <u>0.0109</u> 3044 <u>0.052</u> 33526 <u>0.099</u> 35526 <u>0.099</u> 3553 <u>0.1972</u> 3 35547 <u>0.1872</u> | 2805 <u>0.0109</u> 2909 <u>0.0109</u> 2909 <u>0.0109</u> 3044 <u>0.052</u> 33526 <u>0.099</u> 35526 <u>0.099</u> 3553 <u>0.1972</u> 3 35547 <u>0.1872</u> | 2805 <u>6,0109</u> 2909 <u>6,0199</u> 3044 <u>6,052</u> 3,209 <u>6,057</u> 23 35528 <u>6,099</u> 35529 <u>6,1338</u> 35597 <u>6,187</u> 2
 | 2805 <u>6,0109</u> 2909 <u>6,0199</u> 3044 <u>6,052</u> 3,209 <u>6,057</u> 23 35528 <u>6,099</u> 35529 <u>6,1338</u> 35597 <u>6,187</u> 2 | 2805 6.0109
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312.03 6.0524
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35528 6.1338
55937 6.1338
55937 6.1358 |
| 1011 3776" Tember 1010 3410 ksi. (6mg) 100 100 100 100 100 100 100 1 | 28055 5.006 Mee. 1100 Mee. 2805 2805 5.0009 2909 2909 2.0189 2900 2.0189 2900 2.0189 2900 2.0189 2900 2.0189 2900 2.0189 2900 2.0189 2. | 28055 6,0109
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32273 4.0524
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3593 6.1338
 | 2805 6,009
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3593 6,1352 | 2805 6,009
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35633 6,1338 | 2805 6,009
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35633 6,1338 | 2805 6,009
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35,433 6,1338
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35228 6,089
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3547 6,1352 | 28055 6,0109
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 | 28055 6.0109
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3000 6.033
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33526 6.099
5093 6.1338
35693 6.1352 | 28055 6.0109
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3000 6.033
33526 6.099
5093 6.1338
35693 6.1352 | 2805 6.0109
29.09 d.0.189
30.04 d.0.33
3.2.73 d.0.0723
3.5.28 d.099
5.5.83 d.1338
5.5.83 d.1812 | 2805 6.0109
2909 4.0189
3044 4.035
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35528 6.099
5-583 6.1338
5-583 6.1352 |
| 1011 -3736" Tember 1evel 34.0 ksi (6008) 1.8 | 2805 2106 mes. 1100 mes. 2100 mes. 2 | Z805 Live me. 1126
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2805 6.009
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5437 6.1552 | 2805 5.009
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35273 60099
35273 60099
35273 601338
 | 2805 6009
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3044 6032
3137 60052
35273 60099
35273 60099
35273 601338 | 2805 6009
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2909 60199
3044 6032
3137 60052
35273 60099
35273 60099
35273 601338 | 2805 5.009
2805 6.009
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3044 6.033
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5438 6.1338 | 2805 6009
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3044 6032
3137 60052
35273 60099
35273 60099
35273 601338 | 2805 6009
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35273 60099
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35273 601338
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3044 6032
3137 60052
35273 60099
35273 60099
35273 601338 | 2805 6009
2805 6009
2909 60199
3044 6032
3137 60052
35273 60099
35273 60099
35273 601338 | 2805 6.0109
2909 6.0199
2909 6.032
3000 6.032
35273 6.0524
35283 6.1338
3543 6.1338 | 2805 6.0109
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3543 6.1338 | 2805 6.0109
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3543 6.1338 | 2805 6.0109
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3543 6.1338 | 2805 6,0109
2909 6,0199
3044 6,035
3,27 6,052
35223 6,0723
3523 6,1338
5593 6,1338 | 2805
6,0109
2909 6,0199
3044 6,035
3,209 6,0052
35223 6,00723
35223 6,1338
5437 6,1338 | 2805 6,0109
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35223 6,1338
5437 6,1338 | 2805 6,009
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31273 6,0723
31328 6,1338
3543 6,1338 | 2805 2,0109
2909 4,0199
3044 4,035
3044 4,035
3137 4,0524
35273 4,038
3543 4,1338 | 2805 <u>6,0109</u> 2909 <u>6,0189</u> 3044 <u>6,052</u> 4 32273 <u>6,057</u> 24 35528 <u>6,1338</u>
 | 2805 <u>6,0109</u> 2909 <u>6,0189</u> 3044 <u>6,052</u> 4 32273 <u>6,057</u> 24 35528 <u>6,1338</u> | 28055 <u>6.0109</u> 2909 <u>6.0199</u> 3044 <u>6.0552</u> 31273 6.05729 33526 6.0899 5-5-83 6.1338 | 28055 <u>6.0109</u> 2909 <u>6.0199</u> 3044 <u>6.0552</u> 31273 6.05729 33526 6.0899 5-5-83 6.1338 | 2805 6.0109
29.09 1.0.189
30.44 6.0.33
3129 0.0723
35320 0.089
5533 0.0123 | 2805 0.0109
29.09 0.0189
30.44 0.033
31273 0.0723
35528 0.089
55937 0.182
 |
| 2726. Tember 1:00 34.0 ksi. (6mg) 1:00 3209 Elt hos [2.9] Lines 0 0 0 0 0 | 2805 6,009
2805 6,009
2909 6,033
3000 6,033
3223 6,099
3593 6,1338 | 2805 5186 mes. 1186
2805 6.0109
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35273 6.099
3593 6.1338 | 28055 5186 mes. 1186
28055 5109
2909 1.0189
3044 1.035
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| #1590359-08 (44 m) FIRET #1590359-08 (44 m) FIRET #16 3 2015 5" Sample Sample | 2805 5.009
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| 15 90359-08 (Mara) Einer 35939 6.1. 1 3 0175 | 2805 5.000
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| 15 90359 - 08 (44 m) king; 3 5 6 37 6 6 3 6 47 2 6 6 5 7 6 6 5 7 6 6 7 6 6 7 6 6 7 6 7 6 | 2805 6,0109
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| #590359-08 (Mara) Einer #590359-08 (Mara) Einer #590359-08 (Mara) Einer #500359-08 (Mara) Einer #50037979 6.3 #5004 #5005 #50 | 2805 5.000
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| 16. WBI-8 Doc 133 2505 64019 2709 610199 2709 610199 2709 610199 2709 610199 2709 610199 2709 610199 2709 610199 2709 61032 2709 61033 2709 61033 2709 61033 2709 61033 2709 61033 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61032 2709 61033 | W.B.L. 1886 1186 | W.B.E. | W.B.E. | 4465 5/86 AFEC 5100
 | West Jille Mes Jille | WES JARE | WES JARE | WES JARE | West Jille Mes Jille
 | WES JARE | WES JARE | WES JARE | WES JARE | WD4.
 | WD. | W.D | W.D | |
 | | | | |
 | | |
| 1479-7735/ 44. 23.00 (14.14) 7479-7735/ 44. 23.00 (14.14) 77003/45 | W.B.L. MES SIRE MES SIRE | W.B.L. MES SIRE MES SIRE | W.B.L. | Mes Jile Mes Line
 | W.B. 1/25 | WES JARE LIE | WES JARE LIE | WES JARE LIE | W.B. 1/25
 | WES JARE LIE | WES JARE LIE | WES JARE LIE | WES JARE LIE | W.D.L. 1/20
 | WOS. WES JAKE LIES | WD4 1122 | WD4 1122 | |
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 | | |
| 1479-7735/ 44. 23.00 (14.14) 7479-7735/ 44. 23.00 (14.14) 77003/45 | W.B.L. 1886 1186 | W.B.E. | W.B.E. | 4465 5/86 AFEC 5100
 | West Jille Mes Jille | WES JARE | WES JARE | WES JARE | West Jille Mes Jille
 | WES JARE | WES JARE | WES JARE | WES JARE | WD4.
 | WD4. | WD4. | WD4. | WD4. | Wot.
 | Wot. | Wot. | Wot. | Wot. | Wot.
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| 1479-7735/ 44. 23.00 (14.14) 7479-7735/ 44. 23.00 (14.14) 77003/45 | W.B.L. 1886 1186 | W.B.E. | W.B.E. | 4465 5/86 AFEC 5100
 | West Jille Mes Jille | WES JARE | WES JARE | WES JARE | West Jille Mes Jille
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 | | | |
| 1479-7735/ 44. 23.00 (14.14) 7479-7735/ 44. 23.00 (14.14) 77003/45 | W.B. | W.B. | W.B.T. 1986 | WES 5/86
 | W 64 | W. D.L. 1/25 J./25 | W. D.L. 1/25 J./25 | W. D.L. 1/25 J./25 | W 64
 | W. D.L. 1/25 J./25 | W. D.L. 1/25 J./25 | W. D.L. 1/25 J./25 | W. D. L. M. C. J. M. J. M. C. J. M. J. M. C. J. M. J. M. J. M. C. J. M. J. M. J. M. J. M. J. | W. D | 10 M C C C C C C C C C C C C C C C C C C
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| 160. WGL-8 (Dor. 23) 200.5 | W.B.C. | W.B.I. | W.B. | 118.
 | W.5. | W. W. C. | W. W. C. | W. W. C. | W.5.
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| 160 WOL-8 (200-23) 2005 120109 | W.B.I. | W.B.I. | WAT STATE | 1/2/2
 | W. 5.1 | W.B.L | W.B.L | W.B.L | W. 5.1
 | W.B.L | W.B.L | W.B.L | W.B.L | WELL SAME
 | 70M | | | |
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| 10. Mat -8 (200-23) 2805 | WAS SALE | MAN STATE ST | W.A. | 26/7 | W.B.
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 | | | | 100 MARY |
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| 10. 1462-8 (200-23) 25005 (2019) 27005 (2019 | W.B. | A STATE OF THE STA | 10 J | 26/2 | 1/2/2 J.
 | 10 M | 10 M | 10 M | 1/2/2 J. | 10 M
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| 10. 1462-8 (200-23) 25005 (2019) 27005 (2019 | W.B. | A STATE OF THE STA | 10 J | 26/2 | 1/2/2 J.
 | 10 M | 10 M | 10 M | 1/2/2 J. | 10 M
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| 10. 1462-8 (200-23) 25005 (2019) 27005 (2019 | W.B. | A STATE OF THE STA | 10 J | 26/2 | 1/2/2 J.
 | 10 M | 10 M | 10 M | 1/2/2 J. | 10 M
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| 10. Mat -8 (200-23) 2805 | WAS SALE | MAN STATE ST | W.A. | 26/7 | W.B.
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| 10. Mat -8 (200-23) 2805 | WAS SALE | MAN STATE ST | W.A. | 26/7 | W.B.
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Test pate 3-4-35		`1	FRACTOBRAPAIC	DAMA	Brong	Wer	WOE-8(4)	4016	U	
Pata Set WBI	7.7.7 \$ \$	CANCK		FLT.	CENER		3.8	Cere		
	30/64	4.0023								
JACIMEN NO. WAT - 8 (DUC 23)	3/2/9	1.0077								
	32273	4.0139				 				
Material 1915-1751 AL.	33328	-31	•					-		
,	34 363	0.0384								
both Load Treaster 07.	35437	_			:					
	36.492	6.0092								
Fastener NO 90359-08 (400) RINET	37547	37547 0,0804			!					
	37979	8811.0								
Ave. 10, 5th 3.0175					-					
ME. Thicknoss .3736"										
Person Dember										
Max. Irres Level 34.0 ksv (Gross)										
Fatzue Life 31979Fittle 2.81 Lives										
Failure In Note B										
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B-2										
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NoTES O Creek

Crack Fract Promensions

Finds CRACK SIZED (EL.)

746

Hole

0.3574

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0.3213

HOLE A CERE 2015 WBE-9 (AL) \$ 8 Berra CEARK FRACTOGRAPHIC ¥ \$ 6.4255 1.0364 12587 52102-10.1044 55055 4.2047 51042 0.0752 8.3781 47883 4.022 49992 0.0547 54000 11.1658 3815 1.0075 53156 6.1301 0.3117 58219. 57164 59020 59020 EITHE 14.37 Lives Fustoner NES 90359-08 (400) Rust Max. Stress level -36.01% (Greg) Freemen No. WAT . 9 (DUC 24) Both Load Transfer 07. 3.0193" 7475- 77851 MBE Fatzono Lite. Me. Thuknoss me. wisth Spectrum Test pate Material Rh Set B - 29

Crack Finel Pimensions

4666

73 8	2741	MAN CRACK	CK STREED (EL.)
		4427	KIEE
	8	0,4255	0.051
	8	9.2729	0.0597
	Ü	0.503/	0.5253

MOTES

Ocrace dimension in direction of crack proposto

HOLE B CELEK 2815 CAN WBI-9 (AL) \$ 8 FRACTOBRAPHIC ¥ 5.7 CRACK 53156 2.0472 0,1828 6.2728 0.0089 0.0246 0.1399 5186 5055 1031 2.228 4.067 51047 52102 54000 56109 \$71164 59020 58219 59020 FILT 14.37 LINES Fastaner MS90359-08 (Man) River Max. Stress level 36.0 45i (Gross) Frames No. MBI-9(DUG24) 7475-T7051 AL. Pomber. .3760" Ave. 4, 4th 3.0193" BAK Load Trensfer Pot Set WBI 名 Me. Thuknoss Fatzus Lite. Speatrum Material Test pate Failure In

Fool Fimensions

Crack

Hole

B = 30

Finds CRACK SIEGO (EL.)

7660

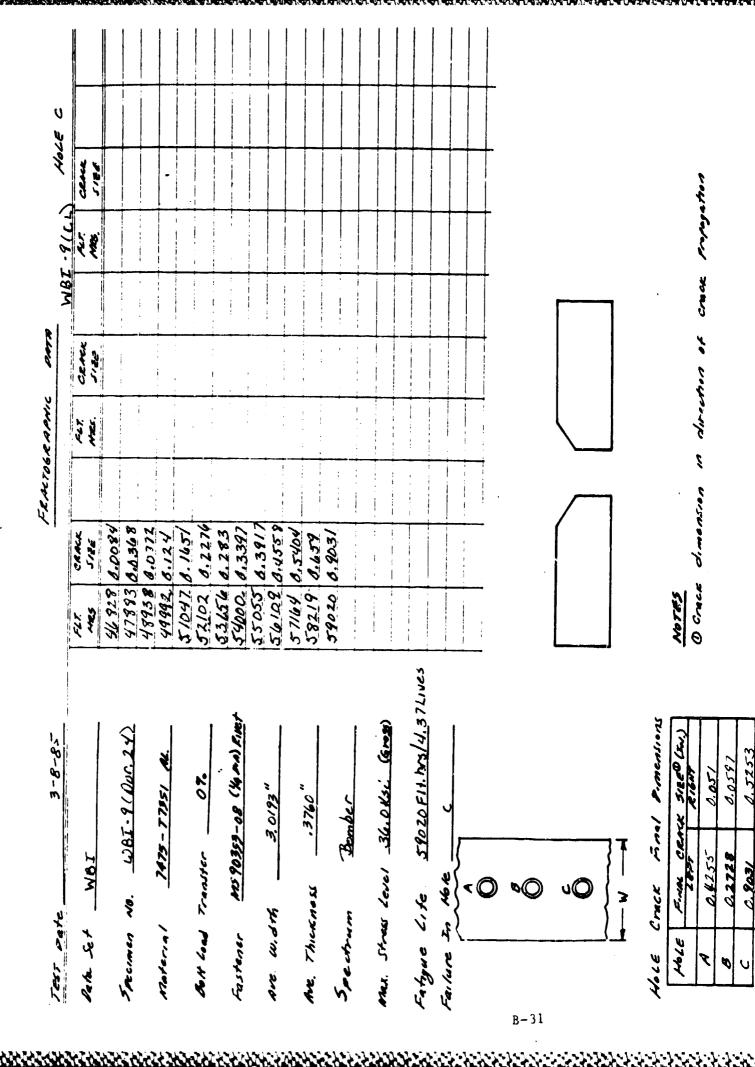
0,4255

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in direction of O Creek



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A. S. A. S. S. S.

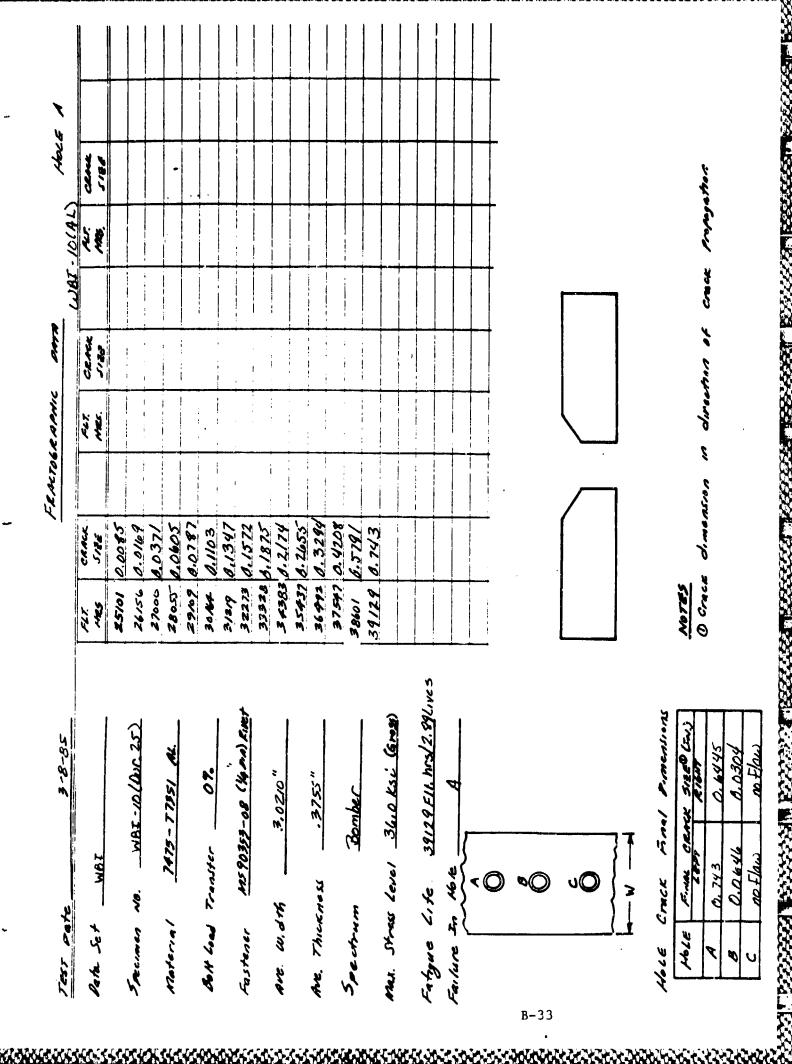
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		FRA	FRACTOBRAPHIC	Eres :			7 9 7	
747					WRI-9163)	(63)) 6726	
Pater Set 1.) BT	7.7.4	CANCK	F47.	CENT	2	ALT. CEME	1	
	70000	>000		2/2	X	2/186	2	
Freemen No. WBI-9(DUS. 24)	51047 6.0234	0.0234			i			
	52102 3.6422	3.6422						
Noterial 1475-T1851 AL.	53156 00528	0.0528					-	
	54000.	0.0831		:		 		
Both Load Transfer 0%.	55055 6,1151	6.1151						
	54109.	6.1559				 		
Fastener MS 90353-08 (14 MA) RINET	57/164	0.2132						
	582/9. 6.3057	6.3057						
Ave. 4.4th 3.0193"	59020	59020 0.5253						
Mr. Thursday .3760"								
Jectrum Domber								
Max. Straw Level 24.0 Ksc. (Gross)								
Fatyue Lite 59020 FII. hrs/4.37 Lives								
Failure In Hote								
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HOLE Crack Final Promessions

746	FINE CRACK	CK SIECO (EL.)
	1627	RIGHT
A	0,4255	0.05/
8	87278	6.0597
C	0.9031	1.5253

O Crace dimension in direction



## Contact from Co	### CANCE CA						WBT - 10(AS)	رى د	
1987 - 10(12xx, 25) 31979 3197	1981 - 10(1024-25) 31/19	قىر	77 \$	CABCK	Ke.	¥	Ž!	ļ ·	
ives	475-77951 M. 675-77951 M. 675-77951 M. 3.0210" 3.0210" 3.0210" 36.0 454 (4008) 34129 FILMS (2.87 LIVES		10/4	6.0116		,		21/86	
3.0210" 3.0210" 3.0210" 3.0210" 34.0 \$\$i. (6008) 39/29 \$\$, hrs. 2.89 \$\$	675-77851 M. 657-08 (Man) Eller 3.0210" 3.0210" 3.0210" 3.0210" 4.045i (600) 34129 FILths (2.87 Lives)		3/2/9	6.0423					
3.0210" 3.0210" 3.0210" 3.0210" 34.0 \$\$i (600) 34129 \$\$ill.bas(2.8% Lives) 4	3.0210" 3.0210" 3.0210" 3.0210" 34.0 456 (6108) 34129 FILMS (2.87 LIVES		32273	0.0758		1			
3.0210" 3.0210" 3.0210" 36.0 \$\$i (\$10.87\1.46.5) 39/29 \$\$i\thesiz. 87\1.46.5	3.0210" 3.0210" 3.0210" 34129 FIL. hrs. [2.89] 4	7475-77951	33328	4.1084				•	
3.0210" 3.0210" 3.0210" 3.0210" 34129 Ellibra (2.89 Lives	3.0210" 3.0210" 3.0210" 3.0210" 34.0 \$\$i (600) 34129 \$\$ill bos (2.8% Lives) A		34383	8.1435					
3.0210" 3.0210" 3.0210" 3.010" 3.0210" 3.0210" 3.0210" 4.045.891.ves	3.0210" 3.0210" 3.0210" 36.0456 (6.004) 34129 FILthrold. 87 Lives		35437	6.1842		:			
3.0210" 3.0210" 3.0210" 38601 34129 34129 34129 4	3.0210" 3.0210" 3.0210" 34129 34129 34129 34129 4	-	36972	0.2492	!				
3.0210" 39601 39752" Sember 36,0 15 i (6mg) 39/29 Flt. hrs. [2.89 1.1ves	3.0210" 38601 39129 30mber 36.0 ksi (600) 39129 Ell. hvs (2.89 Lives) 4		37547	6.3334			-		
39,29 .3755" Bomber 34,0 48i (6mg) 39129 4	39129 .3755" Bember 34.0 tsi (6mg) 39129 Fl. hrs. 2.89 Lives		3860/	3.483					
30 186 (600) 34,0 186 (600) 34,129 F/Libra (2.89 Lives	300 tsi (600) 34129 FILMS (2.89 LIVES		39129	A.1.005					
300 Ksi (6008) 34129 FILhrs (2.89 Lives	34.0 ksi (6108) 34129 Flibrs (2.89)			•					
34.0 ksi (600) 34.24 Filibra (2.87 Lives 4	34129 Filths (2.87 Lives								
34.0 ksi (6mg) 39129 FILMS (2.89 Lives	34.0 ksi (6008) 34129 Flibrs (2.89 Lives								
34129 Flibrs (2.89 Lives	34129 FILMS (2.89 LIVES								
34129 FILMS (2.89 LIVES	34129 FILMS (2.89 LIVES								
39129 FILINS (2.89 LIVES	39129 FILINES	v. Strew Level - 34,0 tsc (Gross)							
39/29 Fli. hrs. (2.8% Lives)	39129 Fli. hrs. (2.8% Lives)		-	-					
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Works dimension

Finel Pimensions

Crack

HOLE

Find CRACK SIREO (Ta.)

3794

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6.4445

0.743

0.0304 00 Elaw

Ochace dimension in direction of chack properties

HOLE CENER 2165 (78) 01 - 18H RE-10 (8T) 38 CENTR FRACTOSRAPHIC ¥ 61. 2186 0.0449 CRACK 0.0056 36912 0,0153 27547 0,0277 6.0446 35437 38601 39129 Fatyue Life. 3912961146 2.89 Lucs NS 90357-08 (14 ma) FIRET Max. Stress Level 36.0Ksi Gor. Specimen No. WBT-10 (DW. 25) 7475-77851 3.0210" ,3255" Both Load Transfer TOM Are. W. Sth 18 to ME. Thuknoss Test pate Speatrum Fastener Failure In Material Para Set B - 35

crack foregation

dimension in direction of

MOTES O Creek

Crack Final Pimensions

512 c0 (EL.)

Find Gener

7816

Hole

6.6445

0.743

B

1.0304 no Flaw

no Flaw

Section Sect					THE PERSON NAMED IN COLUMN			
MKC - 12 (DDC 22) 32233		7.7.7	CANCK	13 E	CRACK	₹ ₹	Cere	
12 12 (105.27) 32213 0.0441 35923 0.0441 35923 0.0441 35923 0.0441 35923 0.0441 35923 0.0441 35923 0.0441 35923 0.0441 39625 0.1441		3		į			73,,6	
405 - 14 (105 - 14) 33328 6 0.247 3593 0 0.883 3593 0 0.049 399 0 0 (4,00) 0.00 399 0 0 (4,00) 0.00 399 0 0 (4,00) 0.00 399 0 0 (4,00) 0.00 399 0 0 (4,00) 0.00 399 0 0 (4,00) 0.00 399 0 0 (4,00) 0.00 399 0 0 (4,00) 0.00 399 0 0 0.00 399 0 0 0.00 399 0 0		32273						
2 5 5 3 5 3 5 3 5 3 5 3 5 3 5 5 5 5 5 5		33328		1				
2003 (Man) and 35471 (A.0.494) 25472 (Man) and 35472 (M.1332) 2043 (Man) and 35472 (M.1332) 20542 (Man) and 35472 (Man) and 3547		34383	0.03 gr	-				
30/93" 30/93" 30/93" 3767 20/84	·	35437	6.0499				-	
30/93" 30		36972	6.0443					
30073" 30073" 30073" 30073" 30073" 30073" 30073" 40073 (4103.4) 40073 (4103.4) 40073 (4103.4) 40073 (4103.4) 40073 (4103.4) 40073 (4103.4) 60 Crace dimension in direction of contractions.		37567	6300			·		
30/93" 30/93" 376/ 376/ 30/93" 40078/2012 40078/2012 40078/2012 500/05		70702	4 1114	<u> </u>	-			
30/93" 376/4" 36/078 61/491 36/078 2.976/4 36/078 2.976/4 36/078 2.976/4 36/078 2.976/4 36/078 2.976/4 36/078 2.976/4 60 78 2.976/4			7,111	-				
3.0/93" 376/" Bonder C 34.0 [53.0 (\$10.00) 400 78 [2.1971 Lucas C C C C C C C C C C C C C			15077	!				
30.055" 30.0 K3: (sing) 400 78 12.97 Luca 6		- 1	7601.0					
36.0 Ksi (4000) 36.0 Ksi (4000) 40078 [2.97] uss Court 51000 (tw) Court 51000 (t	ı							
36.0 K3.0. (6102) 36.0 K3.0. (6102) 36.0 K3.0. (6102) AD 78 12.97 14.02 Final Primensions MOTES COLUMN 51820 (12.) O Grack diagnosis in direction of continuous of continuous diagnosis.								
36.0 Ksi. (6108) 4/0078/2.4316.1423 C C Total Finentius Ceart 5180 (EL.) 0 Crace dimension in direction of Col.								
34.0 Ksi (sing) 40078/2.871/4/42 C C C C C C C C C C C C C C C C C C				-				
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4078 12.97 Luica C C Canal Femensons Mores Conuc dinamin of Con Con Con Con Con Con Con Con	Mar. Jrack Level Junksu (Small)			-				
Tinel Primensions May 85 Control Primensions And 105 Control Primensions				-				
More 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0								
0 0 0 0 0 0 0 0 0 0	1616			+				
Crack Final Pimensions Crack Final Pimensions Crack Final Control O Crack Control O Cra	₹							
Crack Fine Size (EL) Crack Fine Cent Size (EL)		i						
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Crack And Primensions Crack And Primensions Crack And October A. 1491 A. 1491 A. 1492 A. 1492	•			İ		1		
Crack Fine Size (EL.) Crack Fine Class Crack Fine Class Crack Fine Class A 149 0.1052	v							
Crack Finel Finensions Crack Finel Finensions Crack Fines Class A 1491 A 1432	<u> </u>			<u>.</u>		÷.		
Crack Finel Finensions Crack Fines Size (Ed.) Fines Clark Size (Ed.) A. 1491 A. 1491 A. 1432						•		
Crack Finel Finensions Crack Fines Class Fines Class Size (Ed.) 1. 1491 1. 1491 1. 1491 1. 1491 1. 1491 1. 1491 1. 1491	}					1		
Crack Finel Primensions NoTES Final Crack SizeO(EL) 1. 1491 1. 1491 1. 1491 1. 1491 1. 1491 1. 1491 1. 1491	I							
Finds CROCK SIRED (Tax) NOTES 1 149 Oilo52								
1. 1491 0.1052 O Crack dimension in direction of Cr	l u	NoTES						
A. 1491 0.1052	76.55	0 000	9	2	y		setter.	
1221	0.1491)			•			
	1221							

0.8015

Tess pate 3-17-85		\	I THE SERVICE	SIMMO	Brown	15.BE-12(0T)	(78)	MEKE	8	
	FLE	CAACK		647.	Cener	7	137	2000		
Nata Set	53%	27/26		Mes.	2/20	3	\$	5186		
,	36/64	6.0105								
Specimen No. WBE-12 (DUF. 27)		2100		!			-			
	32273	80700								
Material 1475-77851 AL.	33328	0.0409					•	•		
	34 363	6.0437		i						
Both toad Transfer 0%.	35437	0.1348								
	36.492	0,1953								
Fastener MS 90359-08 (4001) RINET	37547	6.238			. !		 -			
•	38601	6,3056								
Ave. 4, 4th 3.0193	35968	6.380/								
	40078	6,433/		!						
Me. Thickness .3761"										
			!							
Jeetrum Domber				:						
										
Max. Strew Level 34.015 (Gross)										
			:	1						
Fatzue Life 40078Filthes 12.97145			!	1						
F. 1. 12 14 186										
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O Crack dimension in direction of

Crack Fract Promensions

FINAL CRACK SIREO (FL.)

766

4666

0.1052

0.4331

1860 C 2015 CERE WBT-12(CL) CRACK FRACTURRAPAIC k k 2,6733 5186 3.0185 1.0345 2.6534 37547 0.3368 6.8015 4.4489 18.19.0 6.0103 6.1532 36 492 0.2789 40134 CRACK 6.1241 34383 8.1913 0.093/ 35437 0.2191 33328 26156 28055 31219 32273 40078 27000 29109 10152 30 KA 33968 38601 40078 FIL hrs/2.97 Lives WBI - 12(005.27) NS 90359-08 (400) FIRET Max. Stress Level 36.0 Ksi (Gross) 3-13-85 1475-T7851 AL. 3.0183" .3761" Bomber WAT Bott Load Transfer 16 to Fatzue Lite. Me. Thuknoss Specimen No. Ave. W.dth Speatrum Test pate fastener Failure In Pata Set Material

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HOLE Crack Final Pimensions

3791	Finds CRACK	CK SIEED (EL.)
	44.27	K1913
R	0.1491	0,1052
B	2.433/	8777
C	0,8015	0.6522

NoTES

O crack dimension in direction of crack proposition

Jest 3-13-15							
		<u> </u>					
Pate Set WAI	F4.7.	S/ZE	FLY.	CRACK	₹ ₹		* *
	36//4	6.0074					
Specimen No. WAE-12 (DUG. 27)	3/2/9	6,0013					
	_	4.637					
Material 7475-77851 AL.	33328	8.0639				٠	
	34 363	383 0.0845		!			
Bot load Transfer 0%.	35437	35497 6,1266					
	36.492	6,155		i i			
Fastener MS 90357-08 (M.M.) RINET	37547	375476.2414					
	38601	0.3235		:			
Ave. W. Sth 3.0193"	3365	39656 0,4916					
	40078	0.6522					
Me. Thurnoss .376!"							
Speatrum Bomber				i			
Max. Stress Level 34,0 KSi (Gross)							
Fatine Lite 40078 FIL hrs/2,97 Lives							
tailure in role t							
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NOTES

HOLE Crack Final Pimensions

2794

Crock dimension in direction at once proceeding

33/ 0.428

O crack dimension in

O crace dimension in direction of crace integral incontessink of Contect with bore at 0.2312 in Fron larger Flow origin in countersink of a 2006 in from larger Flow. All measurements taken from point of 1 4016 CERE 2110 WBI -13 (AL) Crack 38 @ 1618 with layest dies CEARK 1130 FRACTOSRAPHIC 7 E 7. conket with boic CRACK 1.05.26 47100 1.0224 1860.0 1.0126 6.0076 1.0345 5186 111000 MOTES 57164 5/047 55055 57458 2 60/25 52101 53156 57659FIFHS/4,271,ves M5 90353-08 (14 ma) FIRET Promensions Mar. Stress Level 36.0 Ksi (Gress) Freemen No. WBI . 13 (DUC. 30) SIECO (EU.) D. 1215 0 2.0567 1.0528 7475-77951 Both Load Transfer 0%. Pomber 3.023" .37734 F.Max CRACK ぶっこ WBI 0.2383 0.1204 0.2611 Fatzuc Lite. Crack Me. Thuknoss 3 Test pate AVE. W. STh Spectrum Failure In Material Fastener Para Set 379× HOLE 8 8

のこれがの対象がなからない。

		X	FRACTOGRAPMIC	PAPAIC	Dara	1.12T-12(4)	(/0/2	HOLE	Ø V:	
1655 pate 3-12-03						202	(201)			
	777	CKACK		F4.7	Cerek	13	3	CACK	-	
Pota Set WBI	1465	5/86		F.	2/30	Á	*	981		
	5/267	8.006.7								
SACCESS 4/8 WAT - 13 (NIF. 30)	52.00	85144			:					
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	23/56	_		:	:		1	-	+	
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	22055			,						
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B-41

Ocoace dimension in direction or continuous and Contect with bore 0.2312in. From larger Flow origin in countersink at 0.2809m from larger Flow. All measurements taken from fount of society that

Nores

0.12150

0.1204

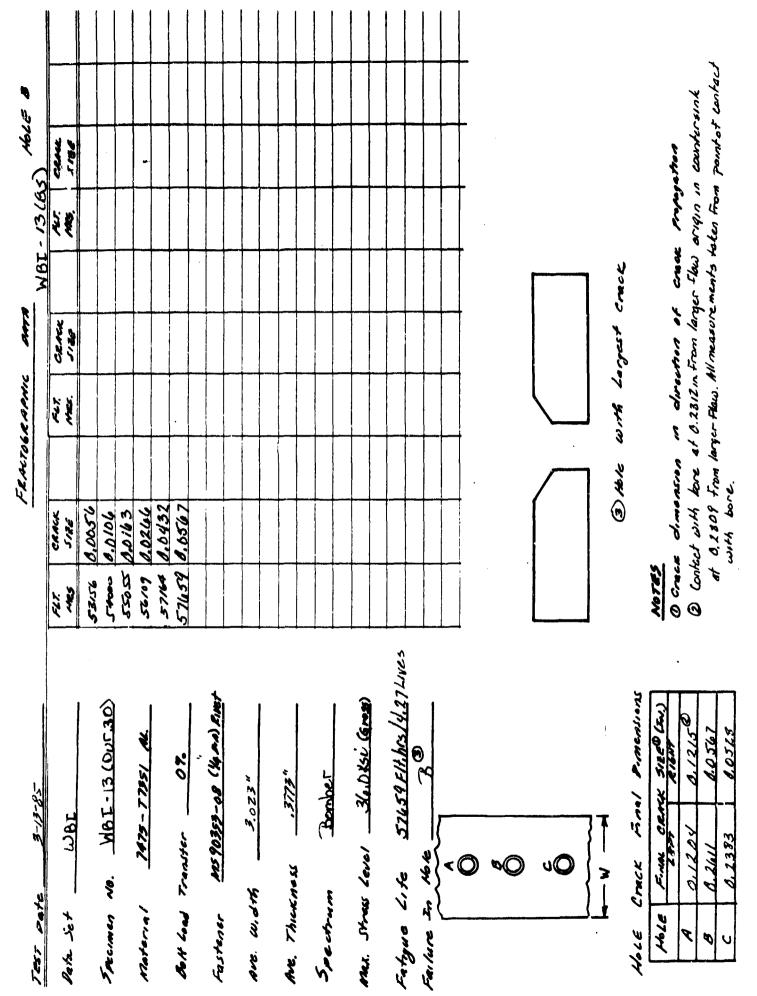
1,0528

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HOLE Crack Finel P. mensions

2791

3 Hole with largest crack



		`1	FRACTOSRAPHIC	STAN S	WAT-1961	7 379/	
icsi pate 1100					(Jan) ()		
	777	CKACK	722	CRACK	is.	CERT	
Vate Jet WAI	Mes	5186	MES.	2/4	Ź,	2315	
	46828	6828 0.0129					
Second No. WBI. 13 (DUC. 30)	47883 6.02/2	0.02/2					
	£8937	4.0409					
Material 1475-77851 AL.	1992 D.0554	4.6556					
	5/047	51047 0.0158					
Both Load Tronsfer 07.	17.044/	1.0941					
	5355 01147	24/1/0					
Fastener MS90353-08 (Moma) Rivet	54000 8,1353	8,1353					
	55055 11611	0.1611					
Ave. W. Sth 3.023	55.09 8.1917	6.1917					
	5716 12151	12151					
Me. Thickness .373"	57459 6.2383	6.2383					
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Spectrum Bomber							
Max. Strass level 34.0 hsi (Gross)							
Fatywe Life STUSTELLAS/4.27Lives							
Failing In the A							
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3 Hole with Langest Crack

NOTES

Frol P.men.

Crack

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2791

- O Grack dimension in direction of creak propertion
- O confect with bore at 0.2812in from larger flow origin in countersink 0,2809in from larger flow. All measurements taken from points to contact with bore

0.0547

0.2383

2,1209

The Set WAL The S		•
## 1005.33 32273 6.012 ## 1005.33 322273 6.0129 ## 1005.299 ## 1005.299 ## 1005.299 ## 1005.299 ## 1005.299 ## 1005.299 ## 1005.299 ## 1005.20 ## 1005.2	18.7	- Constant
MBE-16 (DNF. 33) 33328 34387 615-77851 AL. 35492 61 37547 39601 330170" 3,0170" 3,0170" 3,0170" 34,1609 41,1609 41,1818 34,08218 41,82838 41,82838 41,8938	8	2/26
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HOLE Crack Finel Pimension

CK SIECO (EL)	K1647	6.325-5	0.23/2	0.04/3
FINAL CRACK	1821	4.8744	0.1081	0.0322
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15 70357 -08 (Mara) Enert 4/2 4/3 10 12 37.57" 10 20 20 10 4/8 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		45773	6.14/					
47 3.010" 48 198 108 108 108 108 108 108 10		378975	6.1754			- ,		
18 3.0/10 48 18 3.57" 19 49 10 1 36.08 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1		47883	6.2274	******		1		
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6.0322	0.3764			!		****		
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CERT 2815 38 Just 485 -16 (82) 2/4 CRACK Fe 7. 5186 0.0682 48938 0,2153 0.1254 0.0752 0.23/2 2.0474 47883 4.1928 CRACK 46828 0.1656 1260.0 43664 0.1118 457730.148 49866 41555 44719 42609 40,500 39656 Fatywa Life. 49866 FILMS 3.68 Lives Fastaner MS 90359-08 (4000) FIRET Max. Stress level 34.0 Ksi (Gross) Specimen No. WAST-16 (DUC. 33) 07. 3.0170" ,3757 1475-77851 Bomber Both Load Transfer Wer 1610 ME. Thuknoss Spectrum Are. W.dth Material Test pate Failure In Pata Set

HOLE B

FRACTOGRAPMIC

Final Pomentions	CRACK SIEED (TW.)	181607	164 0.3255	9 ,	0 0013
Cruck	7	185	0,9764	0.108	00223
Hole	2791		V	8	Ú

dimension in direction of creek O Crack MOTES

popologe

APPENDIX C

FRACTOGRAPHIC RESULTS FOR SINGLE HOLE DOG-BONE SPECIMENS (Phase 2; Test Series IV(a))

Fractographic results for dog-bone specimens (Fig. 2) tested under test series IV(a) are presented in this section. These tests were performed at room temperature in lab air using the F-16 400 hour spectrum [4].

Replicate fatigue tests were also performed under General Dynamics, Fort Worth Division research [2]. These additional test results and fractography are compatible with the results for test series IV(a). Moreover, the test specimens for Ref. 2 were from the same batch of material as those for test series IV(a). The test setup is shown in Fig. C-2 and fractographic results are presented in Table C-1. Typical fracture surfaces are shown in Fig. C-2.

FLACTOSKAPHIC ANTA

Secres No. Walle-5 (12 12)

Test Series IVIA)

MS or

Path Set WWOF

1475-T7551 AL.

Material

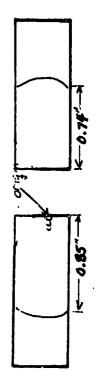
Fastener NASGEOU (Yet)

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ore width

Both toad Transfer 0%.

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75	, 1																					
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***	1	1840 0.0065	135th	19200	19Eco 1.0916	zan	20400 0,1081	20800 0.1201	21,200 1349	2/400 0.151	22000 1159	224W 0.1996	2280 0.2257	23200 1.2548	23600 0.2916	24000 8,3349	24400 1.3428	24800 11.45VA	25200 0,5336	25uc 6.443	25431 6.85	
CAMER	2/16	6.00.57	d.cvi6	4.01.07	1.0121	0.0130	4.0140	6.0152	0.016%	0.0178	13600 0.0205	1400 C. 0236	1440 6.0277	5.0311	15200 0.0351	0.0383	1.4435	1440 0.094 G	16800 0.0477	17.20 0.0536	1.0574	8:0018
171	ş	10000	10460 D.C.36	1080c	11200 00211	11400	120,00	12 400 6.0152	1280 0.0167	13250 0.0178	136.00	1400	14400	1480 6.0311	15200	15400 0.0383	10000	11/400	10.800	17.20 K	17400 0.0574	18CDC 6.0118



4-12-85

test rete

0.74"

1. 85 "

Motes:

Mas. Street Level 340/24 (6198)

F-16 400 HR.

Speatrum

.3765"

ME. Thuknoss

25931 FUT HES

Fatzone Lite

Final drack Sizes

FRATOSKAPNIC

古古典人名西西斯 人名英格里斯

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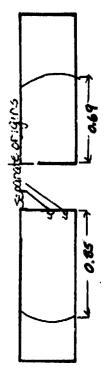
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	00911	6.0058	2000	1780.9		
Freemen No. WINFF-6 (Bir. 41)	/2000	12000 0.0004	היווית:	1.09.75 July 1.09.75		
	12400	12466 6.00.70	77.800	201800 0.1107		
Motorial 7475-T7851 AL.	00871	1.06.84	21200	21200 0,1237		
	13200	13200 0.0074	21600	21600 4.1435		
Both Load Transfer 07.	13600	6.0107	2260	2256 6.1430		
	14000	0.0127	224CO	2240 0,1852		
Fastage NAS 4204	1446		22.800	22.806 1.2169		
	14800		23200	23.200 6.2405		
10000" 3,0/00"	15200	1.0178	236C	23600 3.1742		
	15400	15400 6.0203	20100	2 1100 1,3106		
ME. Thus no 11 . 3770"	16000	6.0233	24466	24466 6.3546		
	11.400	0.0206	2480	2480 1.4117		
Speatrum F-16 400 ME	28 9/	36000	25200	25200 0.4783		
	17,200	17.200 0.0346	2.560	2560 1.558		
Max. Straw Level 34,0 KS. (Gross)	1 TIPLU	1 TINCK 4.0398	74000	24000 0.656		
	15000	15000 d.0454	24.334	0.650		
Fature 1. to 26336 FLY 1185	13451	18404 0.0512			•	
	18800	18800 0.0381				
Final Chark Sizes	1920	1924 6.0643				
	1940	19UN 0.0759				
77						

4-11-85

Test rate

0.69" 72

0.85 17



Notes:

110 38 1.0878 1.2197 .2435 1369 4.58 6.6255 CEME 6.1547 0.1946 2732 XXX 173 2246 FRATOSRAPHIC 25200 241.50 22000 23200 23600 27200 21000 CO11. 24800 251600 24400 21:000 24.400 27551 6343 1.0094 0.0156 0.0240 1.0287 0.0434 J.00.26 1.0199 0000 5186 1.0520 2.0319 11-11-1 10351 12800 1880 1340 Since 12000 2000 16.500 2000 9400 Freemen No. WINPE-7 (LUI. J.Z.) Material 1475-17851 AL. of the street level 340 ks. BA Low Transfer C ? 10 W. d. M. 3.0.140" AR. Thukmoss .3770" 27551 Fastener NASGROY Test Series II(a) Final drack Sizes Pot set WWIPE Speakum Fatzus Life

Orgin Nect Middle

4-16-85

Test pare

0.78"

Notes:

Field FRACTOGRAPHIC ₹₹

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Test Series IVIA)					
Pot St Warps	175/ 175/	SARCK	75.5	Seret Ceret	
	12400	10075	20800	20800 0.085	1
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	13200 0.0114	P110:0	21400	2 1400 4.1028	
Notorial 1415-17851 P.	13606 0.0126	8.0126	2.2000 8,1146	3,1146	
l	14000	14500 0,0139	22400	22400 1.1276	
BA last Transec O To	14420	14:00 0.0155	22800	22800 0,1407	
	14800	14800 8.0170	23.200	23 200 6,1572	
Freshore N.ASW204	15200	15250 0.0190	23600	23600 0.1701	
	15000	15200 6.6213	24000	2400 6.1982	
100 W. ST. 3.0245"	74500	14500 0,0230	24400	24400 6.2220	
	Jib4CC	16400 0.0244	24800	24800 0.2446	
A Thursday , 3765"	111.900	1490 C. 0248	25200	25200 6,2732	
	17200	17200 0.0325	25400	25400 1, 3038	
Speatrum F-16 400 MR	17400	7400 6.0302	26000	24000 J.3386	
•	1800	1800 1.0347	26400	26400 0.3742	
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Test Date 4-16-85

" 018.0

0.890 "

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27400 0.5443

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19:00

FLT HRS

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Fatzono Lite

Final drask Sizes

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1880 18400)

28000 6.434

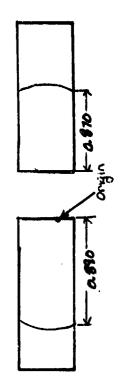
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Notes:

FENTOSKAPANC

Iest Series # (a)						
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	4000	0,0104	jydrú	1.0817		
Sociasos No. WWPF-9 (fist, 44)	7367	400 00114	14800	14810 0.09.20		
	7089	6800 00:24	35.200	15200 3,1136		
Notorial 1473-77551 M.	7200	7200 0.0135	15400	15400 6.1200		
	70.00	76.0.0 0.07	16,000	16000 0,136 4		
Box Load Transfer 6%	2000	8000 0,016/	14400	1440 0.1575		
	300,3	62:10 0 Ochs	CO\$ 21	PC81.6 CO8:21		
Fastoner WAS WICH	\$300	\$500 6.0194	17200	17.200 0.2009		
	4200	9200 0.0225	17400	17400 0.2446		
Bor 14. drf. 3.0230"	8000	9400 0.0250	18000	18000 0.2906		
	00001	10000 0.0.78	18400	18400 0.3432		
ME. Thursnow ,7180"	10:300	10:400 0:02:04	18400	840 0.4070		
	1030	10800 6.03.23	1920	1920 0.4869		
restrum F16 tookk	11200	11200 0.0301	19:00	19:00 0:0010		
	11400	11400 3.0400	1988	19884 6.790		
The Observe Land Billy to the Contract	2000	0615. 8				

58-22-6 Test late

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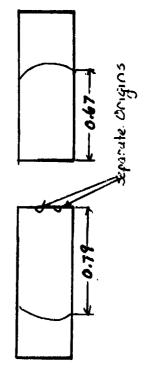
1.0979 1.053/ 4.064V

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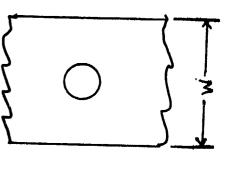
Einal drack

Fatzus Life

0.67" RH



Notes:



Mas. Straw Level 340 KS. (6109)

FRANTOSKAPNIC MOTO

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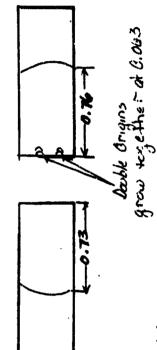
12 - 12 (3) 12 - 12 (3) 12 - 12 (3) 12 - 12 (3) 13 - 12 (3) 13 - 12 (3) 13 - 12 (3) 13 - 12 (3) 13 - 12 (3) 14 - 12 (3) 15 - 12 (3) 16 - 12 (3) 16 - 12 (3) 16 - 12 (3) 16 - 12 (3) 16 - 12 (3) 16 - 12 (3) 16 - 12 (3) 16 - 12 (3) 16 - 12 (3) 16 - 12 (3) 17 - 12 (3) 18 - 1	SIT CINE		3000 0,0030	Specimen No. WWPF-10 (300 45) (1205 3.0103		7475-77851 A.	12450 0.0102	0 70	13200 6.0208	13600 1.0233	1400 0.0275	14400 1,0310	1480 0.0.305	0.3743	15tw 8,0430	F-16 400 HR 1101XD 8,0784
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St Date 4-23-85

0.76"

100

77



Motes:

- Mas. Straw Level 340ksc. (Grog)

2090

10400

2.1911

8000

21550

Fatzus Lite

Final Grack Sizes

FRATIOGRAPHIC MOTO

Test Senes III(a)			3/2/2 X 00:	Rion		
3	13 E	2015 5118	7.5.7 2.5.6.7	CENE	38	18
	11600	11000 00098	20000	2000 6,c706		
Specimen No. WINPE-11 (B.S. 4/4)	12000	12000 0.0106	20460	20410 1.0808		
	OOh 21	11400 6.0117	208202	10800 B, USUS		
Motoria! 1413-1751 A.	00,571	12800 0,0125	21200 0,1030	2010		
	13200	13200 0.0135	21400	2/400 11.1143		
BA Load Transfer 07.	134,00	134.00 0:0147	2200	2200011293		_
	14000	14000 00:0:00	22400	22400 6.1418		
Fastoner 13A3 4204	14400	14406 4.0188	22800 6,1660	6.1660		
	14800	14800 6.0203	23,200	23,200 1,1825		
Ave 14.5th 3.026"	15200	15200 0,0220	23400	23000 6.2008		
	15600	15660 0.0248	2460C	2460C 6.2206		
Mr. Thurson 2.3769"	14000	14000 Just 18	24/10	24/400 6.2442		
	14400	14400 6,0307	24800	24800 0,2739		
See . A F-16 400 112	(160)	1600 A 0250	15200	25000 1210		

Test vate 4-29-85

0.0638

1.5199

27200

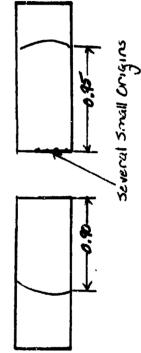
10531

8800

24406

10479

1800



Notes:

Mas. Straw Level 34.0Ks. (Greg)

27872

Fatzus Life

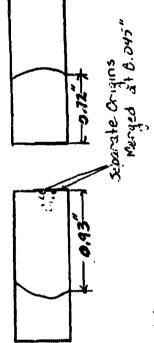
Final drack Sizes

73

FRATOSKAPHIC

SECURE I LENGTE

						L
Test Jenes	277	CABCK	76.5	Cere	4	.
2011/11 13 70	% ***	5186	Me.	2,40	2	4
	Cin	A m73	00811	11,800 0.05/64	25/20	
(N - 1/2)	dela	1 100 16 10 PM	17200	172006.0964		
FREIMON NO. WANT-16 (125.41)	2000 1000	1000	17600	17600 6.1075		4
	91400 A 1117	10117	/ \$000	1.8000 6,1184		
Motorial 1413-11031 Cm.	0000	10000 A 0122	18400	18400 6,1314		-+
	10000	10400 1 0135	903.8/	18806 19,1454		-+
Sott load Transfer U 10	10801	10800 1.0159	19200	14200 6.1591		+
	11200	11200 40185	19400	19wcc 1.1740		+
Fastener TUASAZOS	(1/10))	40201 (1001)	2000	2000 0.1918		+
	17.00	11.00 60724	20402	20400 6.2089		-
Are 14. 5.021	17000	200 0 00 00 C	20802	20 400 6.1281		-
	17 2000	17 200 A 07 48	21100	21700 8.2509		ᅱ
Mr. Thurmoss D. 3/67	12,00	12,00 40343	21400	21400 2,1171		┪
	13/00	13400 00359	27100	27000 0.3084		+
Jet than	COUTIN	WILLOW A MILES	2746	27400 0.3426		7
	COMP	JULLO A. huld 3	2286	22 846 6.576		-
May. 34-04 level 34,0/3 (100)	10801	USON 18.11492	2320	23200 1.4188		_
	15200	15200 6.0540	23400	23400 J.4641	•	-
Fatyus Life Laboration ASILO Fer Has	15/6/11	15h00 6 HLID	2000	2 4000 13 5221		ᅥ
3		2/22	-			_



6.076/

14400

51263

Final death

4-29-85

Test pate

6.72"

0.93"

Notes:

rest series	1K.(a)						
Park Set	IN WIPE	13. X	CAME. SIBE	76.7 176.7	CENE	રંશ	3
,		7200	05000	15400	1.0926	24000	Nom V
Secreta No. W.	Freemen No. WillF - (Br. 43)	2000	0.00%	10.600	11.620 1.6.831	24400	24400 A 507
		3000	\$000 8.0107	3011	1400 0.051.6	CC877	24800 111113
Material /	1475-T7051 AL	3400	3400 6:0128	10 800	14 800 0.1047	25.60 4.70	1.70
		\$800	3800 0,0148	00721	341140 00721		
6th load Transfer 0 %	Sec. 0 76	9200	9200 0.0173	0377	17400 8,1245		
		9600	9600 0.0194	18000	18000 1.1342		
Pastener	NA56204	11.000	0.0218	0.2781	18400 0,1456		
	,	0.400	15. 1. 5. 40 W	1,5782	1880 19.1557		
ore width	3023	90891	10800 0.0270	19200	1920 6.1694		
	1	11700	1120 6.0298	1441	14411 0.1876		
W. Thuknow	0,3772"	11600	11600 4.0332	2000	2000 0.1979		
		15000	12000 0.6380	20400	20400 0,2152		
rectum	F-16 400 MK	12400 0.0414	0.0414	20802	20800 0.2339		

6.333

220a 22400

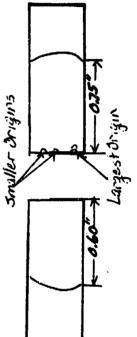
0520

7/2/0

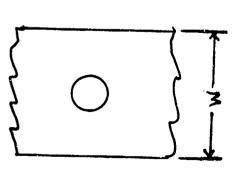
12800 12400

22800

2320 230W



Notes:



Mas. Stone level 34 Likeu (Greg)

25,50

Fatzus Lite

Einal drack Sizes

0.75"

S.E

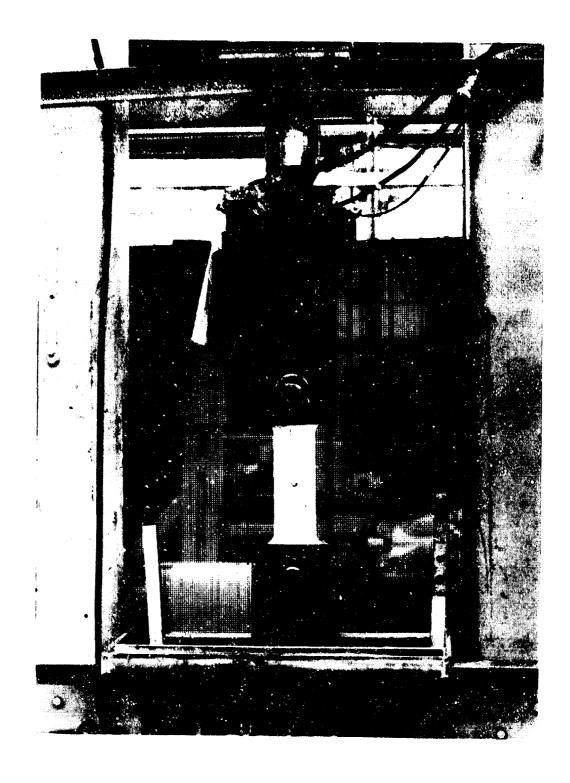
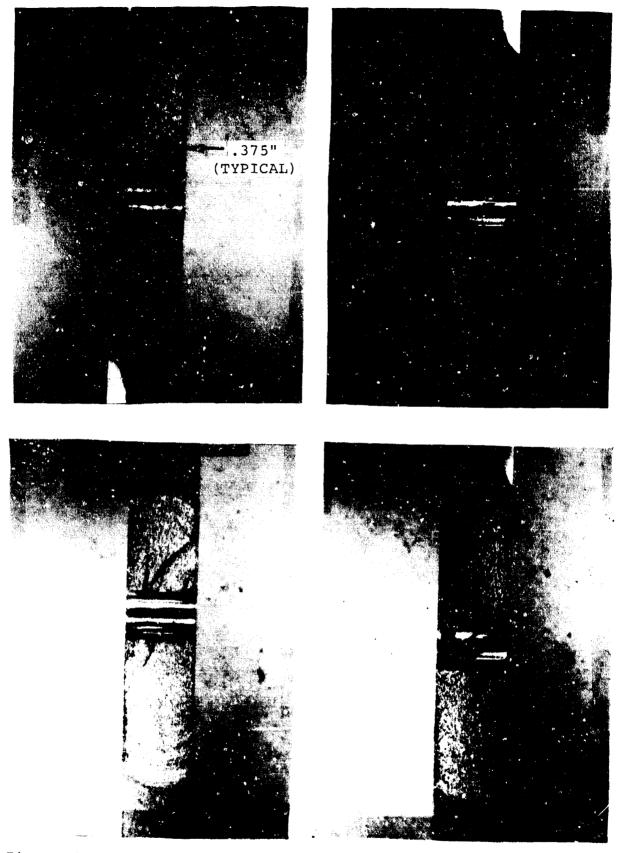


Fig. C-1 Test Setup for 3.00-Inch Wide Dog-Bone Specimens

Table C-1 SUMMARY OF FRACTOGRAPHIC RESULTS FOR DOC-BONE SPECIMENS (W = 3.00", E = 0.375"; NAS 6204 BOLT IN HOLE) SUBJECTED TO F-16 400 dR. SPECTRUM (WWPF DATA SET)

SF	ECIMEN NO).	SE	PECIMEN I	NO. 3	SI	PECIMEN I	vo 3	SF	PECIMEN 1	vo. 4
	CRACK DEF		FLT	CRACK DI		FLT		EPTH (IN.)	FLT		EPTH (IN.)
HRS.		R.H.	HRS	I.H.	R.H.	HRS	L.H.	R.H.	HRS	L.H.	R.H.
29616	.690	.650	18806	.712	.6827	24435	.7800	.5173	25232	.678	.6471
29600	.680	.640	18400	.565	.5427	24000		. 4327	24800	.563	.5262
29200	.530	.520	18000	.478	. 4543	23600	.5581	.3714	24400	.483	.4450
28800	.495	.4509	17600	.4113	.3791	23200	.4950	.3206	24000	.415	.3778
28400	.4285	.3950	17200	.3478	.3181	22800	.4406	.2771	23600	.358	.3210
28000	.3727		16800	.2913	. 2652	22400		. 2399	23200	.305	.2719
27600	.3241		16400	.2491	.2265	22000		.2080	22800	.260	. 2272
27200	. 2846		16000	.2095	.1870	21600		.1778	22400	.218	.1905
26800	.2496		15600		.1568	21200	L .	.1568	22000	.184	.1591
26400	.2219		15200		.1298	20800	1	.1397	21600	.152	.1346
26000	.1938		14800		.1032	20400	1	.1235	21200		.1123
25600	.1671		14400		.0853	20000		.1088	20800		.0923
25200	.1479		14000		.0672	19600		.0960	20400	I .	.0778
24800	.1315		13600		.0579	19200	1	.0840	20000	1	.0641
24400	.1145		13200		.0482	18800	I .	.0745	19600		.0536
24000	.0984		12800	.062	.0412	18400	.1284	.0651	19200		.0451
23600	.0887		12400	.0557	·	18000	I	.0570	18800		.0405
		.0809	12000		.0320	17600	.1050	.0504	18400	ľ	.0349
22800	.0721	,	11600		.0280	17200		.0449	18000	1	.0301
22400	.0664	.0636	11200	.0396		16800 16400	9	.0386	17600		.0272
21600	.0568		10400	.0332		16000		0322	17200		.0214
21200	.0516	9	10000	.0332	.0193	15600		0278	16400		.0186
20800	.0318		9600	.0272	.0149	15200	.0593	.0251	16000	1	.0159
20400	i	.0324	9200	.0244	.0131	14800	.0334	.0186	15600	1	.0134
20000	.0375		8800	1	.0109	14400	.0472	.0166	15200	.0200	1
19600		.0262	8400	.0180	.0087	14000	.0379	.0100	14800	.0160	1
19200	.0317		8000	.0159		13600	.0379		14400	1	.0075
18800	.0284		7600	.0138		13200	.0317		1.4000	.0127	.0057
18400	.0255		7200	.0119		12800	.0292		13600	.0112	
18000	.0231		6800	.0100		12400	.0268		13200	.0098	
17600	1	.0145	6400	.0084		12000	.0245		12800	.0088	
17200		.0128	6000	.0069		11600	.0225		12400	.0076	l
16800	t e	.0110				11200	.0208		12000	.0066	
16400	1	.0094				10800	.0190		11600	.0055	
16000	.0138		1			10400	.0171		11200	.0046	
15600	.0124	٠			j	10000	.0154		10800	.0037	1
15200	.0110										1
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	multi-ori	<u> </u>									
1		3.00"-		-		Materia	1. 747	5-T735 Alu	minum		
			т								
0.375"			Į			Spectru	ım: F-16	6 400 Hr (Johns :	2)	
	<u> </u>				ļ	Stress	34 1	KSI (Gross)		
1			0.2	50"				(
		·									



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Fig. C-2 Photographs of Typical Fracture Surfaces for 3.00-Inch Wide Dog-Bone Specimens Tested Using F-16 400 Hour Spectrum

APPENDIX D

FRACTOGRAPHIC RESULTS FOR SINGLE HOLE DOG-BONE SPECIMENS (Phase 2; Test Series IV(b))

Fractographic results for dog-bone specimens (Fig. 2) tested under test series IV(b) are presented in this section. The fatigue tests were performed at room temperature in lab air using the B-l bomber spectrum [4].

Compatible fatigue test results and fractography were also acquired under General Dynamics, Fort Worth Division research [2]. Test specimens were made from the same batch of material as those for test series IV(b). Fractographic results are presented in Table D-1 and photographs of typical fracture surfaces are shown in Fig. D-1.

STATES STATES STATES STATES STATES STATES

₹ Kier CRIEK FRACTOGRAPHIC Per. 4.2322 CARK 0.2873 C. 3564 3 4383 0,4438 1.1536 2118 1.0947 8811.8 A.4018 1.0481 5.1873 20192 2,0739 35437 6.542 0 3/2 33328 32273 27000 28055 3/2/6 26156 28422 29109 14047 25101 2/937 30 KA 12 F Freemen No. WWP3-5 (DUT. 49) B-1 Bomber 7475 - T7951 AL 1000 W. S. O. 3. C. 2. U. 53-1-6 BN Lad Transfer Fastener NAS 12404 IK(1) BUMIA MR. Thuknows Test Senes _ Material Spectrum Test Pate 18 AS



Hores:

Med. Show level 34,0 454 (600)

36492 FIFHES

Fatzano Lite

Einal Grack Sizes

0.6765"

0.7909"

36972 6.7300

R CEPE FRAKTOSRAPANC 3 8 0.3339 1,2323 3.2486 3.3267 2820 1.0878 3.0164 35.82 1.1926 0.4591 11471 1.1104 5118 2.0019 6.50 10501 12656 18773 19828 20802 24047 1350 60951 16644 21937 25822 61121 ASST. 109/1 174 Freemen No. WINPB-6 (DE,50. B-1 Bomber Meterial 1079-17951 6. Ac. Thucmass 0.3769" BA tow Trensfer 0 %. 100 W. d. th 3.0255" Fostener NAS 4204

III(s)

Test Series Test oute

MMM

Pet 5.1

Notes:

Speatrum

ones. Street Level 340 454 (Great)

0.5803

23701

2.693. 0.8034

75172

27000 2805/

1806

28051 FIFES

Fatywo Life

Final deast Sizes

0.8204"

8.9081"

February Com

	27000 6.0296 27000 6.0296 2805 6.05346 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 2909 6.0589 29596 6.0878 29596 6	Test Series IK(b)							
21.00 (2.296) 1000 (2.296) 1	#### 1 (Mr. 57) 2700 6.0296 ##### 2700 6.0296 ##### 2002 6.0296 ###################################		177	EKAKK	185	Gerek	-	į	3
27000 27000 28655 29008 29008 20100 20100 201004 201004 201004 201004 201004 201004 201004 201004 201004 201004 201004 201004 2010004	27000 27000 28055 2908 2908 2908 2908 2908 2908 2908 2908		763	2005	of E.	***		Ę	146
#### - 7 (Mer. 57) 28655 2909 7073 - 77951 M. 37279 30246 M. 3258 35597 30246 M. 345046 Ch. M. 38596 5126.5 5126.5 M. 38596 EH M. 38596 EH M. 547-85	2005 29009 7073 - 77951 8. 29009 20105 8. 29109 20205 8. 29209 20205 8. 29	•	27000	0.0096					
29/09 29/09 20/09	29/09 29/09 3016 30265 30265 30265 30265 31558	men NO. WW/78-7 (BE 51)	28055	0.0346					
7017 - 71951 & 30149 3107 - 71951 & 31219 3107 - 71951 & 71951	7075-7751 & 2014 31219 312105 31219 312105 31219 312105 31219 312105 31219 312105 31219 312105 31219 312105 314105 31519 312105	29/09	0.0589						
302465" 35277 302465" 34597 302465" 34597 31265 38596 EH MES 38596 63553" 7057 0076 4-1-95	302465" 35277 302465" 345877 3,33258" 34584 4,1-95		79/2						
##5 4204 ##\$ 4204 3.02465" 3.02465" 3.02465" 3.3559" 3.175mber 3.4506si (6000) 5.175mber 38596 EH Wes 4-1-95	##5 4204 ##\$ 4204 3.02465" 3.02465" 3.02465" 3.3558" 3.3558" 3.3558" 3.3558 EH MES 5.126.3 *** *** *** *** *** *** ***		3/2/9						
20245 258" 25677 302465" 26777 302465" 26777 34,0451 (6008) 28596 51263 7657 6076 4-1-85	20245		32273	0.1477					
302465" 35547 302465" 35547 3.02465" 38596 3.1 Bember 385796 Fit thes 51265 6.3758 7057 6000 7057 6000 7057 6000 7057 7057	302465" 35547 302465" 35547 3.02465" 3758" 37596 3.1 Fember 38596 Ett Mes 38596 Ett Mes 4-1-85		33328	6.1856					
302465" 365497 3.3758" 37559" 375596 3.450654 (6000) 385796 EH W.S. 70070 4-1-85	302465" 365497 3.3258" 38596 3.3596 5.17cs are 4-1-85		34 363	6.2377					
302465" 303465" 8-1 Bember 34,0451 Geogy 38574 FH 1465 5126-5 6-1-85	302465" 24.472 3.3758" 38596 2.7567 3.3596 5.126.3 5.126.3 5.126.3 7-657 6-7-65		35487	0.3/39					
31.758" 3.1 Bember 34.0454 Gross 38594 FILMES 51.26.5 4.1-85	31.758" 38596 31.75676 50000 38596 50000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 385996 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000 38596 500000000 38596 5000000000 38596 5000000 38596 5000000 38596 5000000 38596 5000000 38596 50000000 38596 5000000 38596 50000000 38596 5000000000 38596 500000000000000000000000000000000000		36 492	4.3744					
34.04si (600) 34.04si (600) 38.596 EH Wes 5120.5 64 700.7 arte 4-1-85	34.045. Grow) 34.045. Grow) 38.596 EH IIKS 51.26.5 6.4 Test aste 4-1-85		37547	0.4901					,
34.04si Geogram 38.594 FH M2 51.26.5 6.4. Test aste 4-1-85	34.04si (600) 34.04si (600) 38.596 FH 1465 51.26.5 6.4. Test aste 4-1-85		38596						
2-1 Bember 38596 FH 1465 S126.5 (600) 5126.5 Test Date 455.3 " Test Date	2.1 Bember 38596 EH WES 38596 EH WES 400 Test 0000				-				
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38596 EHWES 51265 RM. 7057 0070	38596 EHWES 5126.5 RAN. Test Date	Three Level 340 Lsi (Greg)							
38596 FH WES	38596 EH WES. 844. 6553 7057 Date								
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		FRATOSRAPHIC	KAPAIL	2000		
II(b)	-	CAME	765	Cana	Ž	3
	2002	0.003/		*		3
WWP8-8 (DUC.52)	7-7	7.10.17				
		2,0275				
7755 A.		9.0094		1	+	
	32273 1	0.0744			+	
	3 4383 11.	1762				
WASULLY	9	2381				
4	9	2469			_	
	~	0.3452			_	
*		0.439%			-	
6.3740	1	6.5373				
(2) (3)	40494 10.	1.8043				
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				N. Carrier		
la senes # (0)		2000				
Pot Set WWPB	£ \$	2,000	ž į	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	₹ ₹	18
	\$4937	0.0087				
Franco No. 4/4/18-9 (DUC 53)	-1	0.02.37				
	24047	6.0473				
Notorial 1419-17881 A.	25/01	0.0758				
	26/56	0.111				
6H Los Transfer 0%	27000	6.14/3				
	78052					
Fustener 12.45 6204	29/09	_				
	30.14	0.2368				
100 W. drh 3,00 85"	3/219	4.2954				
	32273					
Me. Thuknow 0.3745"	33328	33328 6,44,72				
	34383	34383 0.6192				
Spectrum B-1 Bomber	35432	35432 6.8475				
Mes. Street Level 340 Ksi. (Greg)						
Fatowo Life 35432 FUT HES					•	
	-		•			
Final drack Sizes						
LH RH						
0.8475" 0,7546"	4-1-85	-			•	•
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ofes:

FRACTOS RAPAIL MAY

Test Serves III(b)							
	179	CABCK		76.5	Genek	Ž	-
Pate Set WWY8	7	2000		į	3		Ž
	27000	0.0000					
Species 20 WINTS-10 (DUC, 54)	2805	2805- 0.0192					
	20/00	20,00 0.0424					
120000 1 1415- T. 1981 AL.	30/66	20164 6.0736					
	3/2/0	3/2/0 6.0992					
Ar had Training	38273	32273 10.1334					
	33328	39328 8.1723					
Festeral NAS 4204	34 346	36 3KE 6.2248					
	35487	35457 6.29/64					
3.0215	36 402	36 402 6.3723					
	37547	37547 6.4857					
A. 74.2.2.2. 0.3760	38596	38596 1. 83/45					
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See A. Annha							
Mar (Ame) 1240/12 (Ame)							
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	26156	0.0037				
Freemen No. WW/PB-11 (DUT 55)	27000	6.0143				
	7805	6.0277				
120100101 1015-TDSI A.	29/69	0.0493				
		4.0674				
SAN Load Transfer 0 %		1180.9				
ı	32273	0.6987				
Fustoner 1.43 6204	33328	33328 0.1271				
	34383	34383 6,1526				
1008 W. 276 3.0080"	35437	35437 4.1692				
	36972	36972 6.2119				
Me. Thusses 0.377"	37547	37547 6.2446				
	38601	8.2828				
Spectrum B-1 Bomber		8.33/3				
		Shon's				
Mas. Show Level 34,085 (Gress)		0.4736				
	42609	8.5898				
Fathers Lite 43064 Fer HES	43444 0.8091	0.809/			•	
Final Cask Sizes						
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(1/4)	•					
(as series Ikie)	277	CAMA	765	Come	-	3
Pote Set WINTS	200	5186	Mes.	21.80	•	546
	25001	1.6052				
Secretary 20 MW/8-12 (000 56)	27.151	810.0				
	27000	0,0355				
1201000 1 1415 - 17551 A.	ZROST	6.0483				
	29/09	4.6647				
At the Transfer of	30/44	77807				
	3/2/0	9.1107				
1. 18502 CV	32273	1482				
	33328					
30005	3 6382	0.2165				
	35477	0.2572				
A. 71	26072					
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	39656	1.5986				
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Table D-1 Summary of Fractographic Results for Dog-Bone Specimens (w = 3.00", z = 0.375", NAS 6204 Bolt in Hole) Subjected to B-1 Bomber Spectrum (WWPB Data Set)

SF	PECIMEN NO. 1		PECIMEN	NO. 2	S	PECIMEN !	NO. 3	SF	PECIMEN	NO. 4
FLT	CRACK DEPTH (IN.			PTH (IN.)	FLT	CRACK DE	PTH (IN.)			PTH (IN.)
HRS.	L.H. R.H.	HRS.	L.H.	R.H.	HRS.	L.H.	R,H,	HRS.	L.H.	R.H.
29858	.8316 .770	34889	.805	.610	34910	.850	.570	39656	.690	.670
29109	.4730 .430	34383	.680	.460	34383	.680	.420	38602	.510	.4587
28055	.2789 .2448	33328	. 480	. 2140	33328	.540	. 288	37547	.3685	.3367
27000	.1709 .150	32273	, 368	.1449	32273	.445	.1919	36492	. 2826	. 2487
26156	.1354 .1007	31219	. 293	.0974	31219	.3618	.1287	35438	.2184	.1866
25102	.1026 .0708	30164	.2405	.0655	30164	.3035	. 08 4 5	34383	.1680	.1395
24047	.0762 .0486	29109	.1998	.0414	29109	. 2542	.0572	33328	.1325	.1040
22992	.0566 .0338	28055	.1639	.0322	28055	.2116	.0387	32273	.1056	.0781
21938	.0414 .0241	27000	.1380	.0245	27000	.1780	.0277	31219	.0850	.0594
20883	.0328 .0183	26156	.1148	.0208	26156	.1446	.0201	30164	.0686	.0461
19828	.0247 .0143	25102	.0942	.0155	25102	.1192	.0161	29109	.0549	.0349
[18773	.0182 .0104	24047	.0762	.0111	24047	.0928	.0120	28 05 5	.0454	.0274
17719	.0131 .0076	22992	.0614	.0081	22992	. 3710	.0090	27000	.0381	.0216
16664	.0095 .0052	21938	.0513	.0065	21938	.0528	.0072	26156	.0316	.0174
15609	.0061 .0034	20883	.0405	.0056	20883	.0397	.0058	25102	.0256	.0138
14555	.0037 .0024	19828	.0335	.0048	19828	.0321		24047	.0211	l
13500	.0027	18773	.0282	.0040	18773	.0260		22992	.0167	.0076
12656	.0016	17719	.0232	.0034	17719	.0206		21938	.0128	.0051
		16664		.0028	1.6664	.0161		20883	.0101	
		13609			15609	.0126		19828	.0078	
		14555			14555	.0097		18773	.0057	
		13500			13500	.0076		1		
		12656			12656	.0053	(İ	
[11602			11602	.0038				
		10547	.0071		10547	.0028	L <u></u>			
₹.8	316" 7.70	٦.	805" - 7.	610"		850"	.57"	7	.69"	. 67"
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ļ	3.00			1	M	aterial:	7475-T7	351 Alun	ninum	
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1		1			S	tress:	34 KSI	(Gross)		
'		 0	.250"							

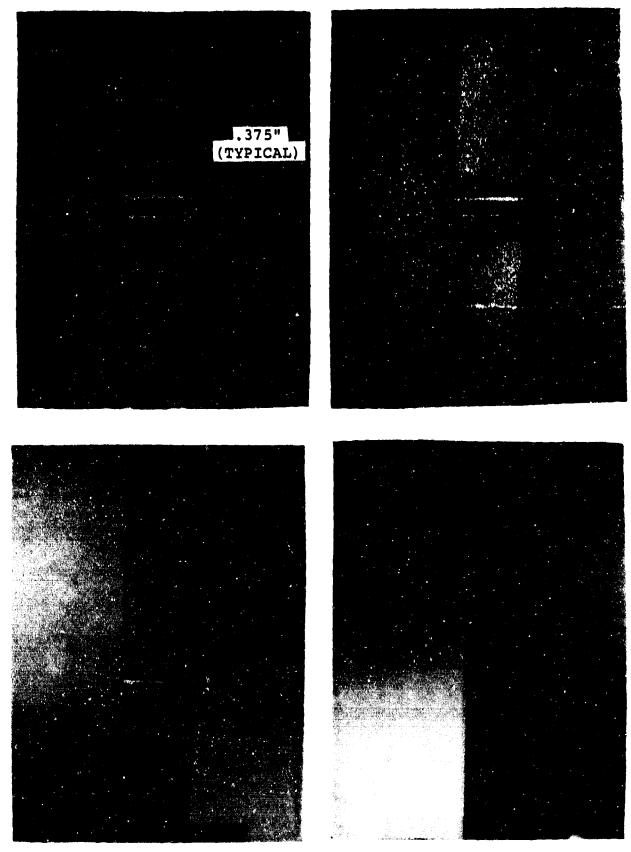


Fig. D-1 Photographs of Typical Fracture Surfaces for 3.00-Inch Wide Dog-Bone Specimens Tested Using B-1 Bomber Spectrum

APPENDIX E

FRACTOGRAPHIC RESULTS FOR SINGLE HOLE DOG-BONE SPECIMENS (Phase 2; Test Series IV(c))

FRANTOSCOPUL MOTO

	Fest Series	IF(c)						i		
1185 MEL 1/10 MEL 1/1			111	CAME		765	Cene		Ž	200
100 - 1 (000 142) 100 - 77851	1	NWPCL	537	5185		žě.	***		8	1100
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100 - 700 d	Secondo No.	WWPCL-1 (RM. 14								
11. 0 % 3.0/60" 3.0/60" 3.0/60" 3.0/60" 3.0/60" 2.0/60" 3.0/60" 3.0/60" 4.0/6 Classical Area of the control of the classical Area of the classica		-		-						
30/60" 30/60" 30/60" 31795" 50/6000 32/240 Eur Mus 7-657 Date 7-70-85		7075 - T7051 A.								
3.0/60" 3.0/60" 3.0/60" 5.795" 7.16.0/0 32.1240 Fur Mes 1.10.53 1.10.53 1.10.54										
32/60" 3-0/60" 5-0/60" 3-795" 1-16-40 32/24° Fur Mes 1.1263 1.1263 1.1264	BK God Tren									
35/60" 3 0/60" 3 795" 1 34 EST (CLOSE) 1 116.3 1 116			ŀ							
3.0/60" -3795" F-/6 L/0 34.65 (400) 32.724 © Fut Mas 1.1263 M Test Date 7-10-85	Fastener	NA54204								
3.0%0" 5.10 c/p 5.10 c/p 3.124 0 c.y ms 7.55 care 7.0-85						800	ected	1		
13795" F-16 410 32124 Eur Ms Suites (dor 14.01h	3.0160"								
12/10 10 4/0 32/24 Eur Ms 14/253 14/253 14/253 14/253 14/253 14/253 14/254 1	1									
1 34 EST (LLOW) 32124 CUT MS 12124 CUT MS 12124 CUT MS	ME. I ANGENOSS	ı		+	-					
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est senes IK(c)	•						
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		0,0033 34400	36,400	0.1513 44800	02 hh	0.5945 53200	53200
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		0.0073 37200	37200	0,1784 45600	45600	0,6752 54000	54000
1010rial 1019-	7479 - T 7051 AL.	0.0107 37606	37606	6.1917 46000	46000	4.7319 54400	54400
ı		6.013/ 38000	38000	0.2003 46400	00696	0.8077 54800	54800
At last Transfer	0 %	1.0145 38400	384,00	0.2189 46800	46800	0.9115 55.192	55.192
		A.0202 38806	38800	0.2332 47200	47200		
Franke NAS 10204	70%	3.023 39200	39,200	0.249 47600	41600		
		8.0283 39600	39600	6.2466 48000	48000		
ore 14. drh 3.0155	155 "	4.0332	1.0332 40000	11.2903 48400	0ah8h		
•		0.0381 40,400	00/00/	0.3107 48800	008.86		
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			*****	2011/10	20101		

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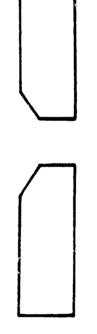
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	40800 0.0497	44200 6.2850	4.2856	57400 0,759	6,7591
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43200	4.1171	51600	0.33.36		
43600	8.1253	52000	6.3526		
44000	6.1354	52400	5.372/		
dyyou	8.1472	5.2 800	8.3918		
44800	0.1546	53200	88/1/8		
45200	9.169V	53600	6.445		
45600	208119	54000	802 4.9		
00075	6,1903	54400	8.4978	Ì	
41000 41200 41200 41200 41200 41200 41200 41200		4/1600 0.0859 42000 0.0921 42400 0.0921 43200 0.1079 43200 0.1253 44000 0.1364 45200 0.1802 45600 0.1802		6.0859 52000 0.3037 6.0921 50400 6.3037 6.1020 50800 6.3032 6.1079 57200 6.3336 6.1253 52000 6.3520 6.1354 52800 6.445 6.1802 54000 6.4708 6.1903 54400 6.4978	50000 0.303 50400 0.3037 50800 0.3142 51400 0.3336 52000 0.3526 52400 0.372/ 53200 0.478 53400 0.478

7-10-85 Test pate



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Jak Set WW/CL)	5.78. 5.78.	₹ ₹	38%	\	
	30800	97.0129	39200	6.3777		
Special 10 WWPEL- 4 (Dr 145)	31,200	8610.8	39400	865.0		
	3/400	0,020.8	40000	40000 6.4128		
Abstorial 1479-1788 6.		6.0369	40 400	40400 0.4317		
	32400	32400 0.0489	40800	46800 0.44.04		
At last Transfer 0 to	32800	0.0000	41200	4.4884		
ł	33200		41600	0.5167		
Fortener NASCON	3360D	1.0921	42006	42006 0.5417		
	34000	34000 6,1033	42400	42400 0.5747		
20255 "	34400	841100 Ot1148	42800	42800 4.4106		
	34800	34800 6.1319	45200	45200 6.6419		
6.3778 "	35200	35200 6.150	43600	1.4.777		
ı	35600	6.1709	44000	6.7185		
Sea. 6-11. 610	36000	4.1381	90/100	44400 8.7657		
	36400	34400 0.2066	44800 6.80	6.80		
Mes (Peace / Less) 34,0450 (Gress)	36 800	36 800 5.237/	45.200	4,5200 0.8513		
	37200	0,258	45400	45400 4.9205		
1 . 1. L US092 Elt Wes	37400	0.2829	76656	1,0334		
	3 8000	6.3078				
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116 5 165	38800	38800 6,35/9				
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38 6.4388 0.7356 6.4856 9.6419 6.3695 0.5487 Ceres 4.4009 3 37200 36 800 37420 38006 38400 38792 36,400 FL7. 6.0339 CAMER 1.0985 1.0487 1.0819 6.1163 1.0492 1.0158 6.1332 0.1632 0.1944 5186 0.0205 10260 0.0416 9.0611 33200 32800 32400 29600 30000 30400 29200 28400 28806 30800 3/400 32000 2800 3/200 111 Freemen No. HWIEL-5 (DEC 146) BN Load Transfer 0 % 1915 - 77951 0,3760 100 w. d. th 3.0210" Fastersor NAS 4204 II(c) MMPEL Me. Thuknoss Spectrum Natoral Test Series Pet 16+

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Test pate

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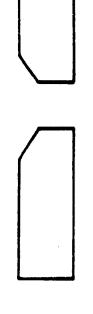
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Mas. Stras Level 34,065c. (Gres)

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	179	CAMER	7.25	Gene	13/2	1
Pot Set WWPCH	***	5106	Mer.	1.00		120
	24800	6.0127	33200	A. 55-26		
Specimen No. WINTEH-1 (DUC 147)	25200 6.015	81018	33600 11.6694	1.66.94		
	25/600	25/400 6,02.19	33452 0.7144	0.7144		
Notorial 1015-77951 A.	24,000	24,000 0,0343				
	20,400	20 400 4.0434				
BA Lond Trensfer 0 %	20802	26806 6.0534				
	27700	27200 8.0496				
Fastener NASU204	27600	27600 6.0927				
	28006	28006 6.11				
100 W. Sth 3.0250"	28400	28400 B.1325				•
	28800	2880 5.1428				
Me. Thuknoss 0.3780"	29,200	29,200 0.1415				
	29600	29406 0.1807				
Speakum F-16 6/0	3000	2000 4.2114				
	30400	30400 6,2425				
Mas. Street Love! 40.8/50 (Gress)	30 500	30 500 4.2709				_
	31200	3,200 6.2999				
Februa 6.4 33/152 FIL HOS	31400	31400 6.3387				
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			SUPPLY SOLVE	RAS		
iest series IV(c)						
	179	CAMEL	7.55	Cene	1	
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-	12000	12000 0.0104	20400	20400 1.6391		
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	12 800	12.800 0.0351	21/12	21112 0.9642		
Motorial 7075-77851 PM.	13200	13200 6.0512				
	13400	13400 0.076				
Bit Load Transfer 170	14000	14000 6.0842				
	14400	14400 6,1034				
Fustoner NASU204	14800	14800 0.1297				
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Ave 14. 3th 3.0195"	15600	15400 0,1475				
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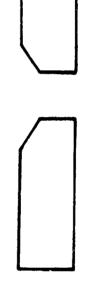
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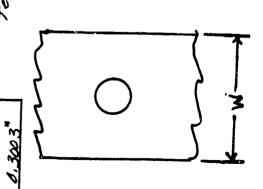
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Mas. Straw Level 40.8 KSU (Greg)

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3,0235" 2,2500 d. 2,2500 d. 2,2000 d. 2,400 d. 2		22000	6.2121					
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25000 2 4000 2 2000 0 2 4000 0 2 4000 0 2 4000 0 2 4000 0 0 0		23200	0,3439					
fore! 40, 8 & 24 100 Fer 1785 14 20 Fer 1785 14 38 43 " 14 38 43 " 15 5126.5 16 18 18 18 18 18 18 18 18 18 18 18 18 18		23000	6.4312					
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10k 5,1263 10k 5,1263 10,3843" 10,3843"								
1ck 5,12es 6,3843" 7csr mre								
12k 51263 6,3843" 7csr mre								
6,3843" Test pare	Final track Sizes							
6.3843" Test note	7.7				 	+		
0,38431	1501		8					•
	0,3843"	ļ						
				\		Γ		
				_				
] -		7		
	_ _							
	\ \ \	Motes	•••					
	- M							

E-9

River CEME 0.9829 3 FRACTOGRAPMIC 32288 3 8 3989 SAME 1.0932 6.2607 11165 9.2356 1,0547 6.0655 0.0742 6.293 1406 11256 1.2021 2.372 1.33/ 28800 27200 28000 28400 25600 24.900 27600 29,200 24000 25200 24400 24800 26000 24400 FUE 6 K los Transer 07 1415 - T 1951 NB 5 6209 Frances No. WINDEN-4 3.0230" MWFCH IV(c) MR. Thuxnoss Test Sana Are 14.21% Speakam Festener Material 12 AS

Motes:

Origin at 0.0345 inches from hore of hole on surface

Now Street Love ! 40.8650 (6008)

.4309

29600

6.4729 1.5208

30000

30400

1.5704

30800

32288 FIL US

Fatzus Life

Final drack Sizes

RA

6883

31600

31200

0,7847

32006

28-22-1

Test Pate

8.3152"

D. 9829"

FRACTOSKAPNIC ANTA

Test Series	II (c)						
		27.5	CHACK	727	Cene	14	1
Pote Set	WWFCH	3	2186	Mer.	1.00	\$	3
		00481	6,1449				
	(A) WALPER-S (B) [51)		29110				
Merces No.		19200					
11 11 11 11	1413-17051 4	19400	0.2061				
			0.2206				
A. C. T. T. T. C. C. C. C. C. C. C. C. C. C. C. C. C.	200	20400	0.242				
The same of the same		20 80¢	_				
6. 4	NAS 1.20.4	21,200					
		21600	21600 6.3424				
707 117	3 02 .5 "	22000	0.3786				
		22400					
	2000 m	22000	0.4885				
ME. I MICK MOSS		23200	23200 0.5416				
5.5.5	6-110 1.10	23600	23600 6.5832				
	, (a)	24000	24000 0.6687				
2	(A) (A)	24400	24400 0.7686				
Man. Jrond Level		24800	0.8608				
•	21681611 162	24980	0,9523				
tatyan Lite	44110Fit #13						
7.5.7.							
FINAL COURT SIZES	57776						
LH KH	3					•	-
1.9523	Seust late	59-62-1					
l							

bks:

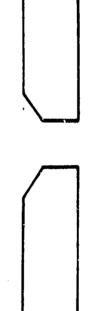
Origin at 0.1045 from the borr on

Test lenes I	II (c)		7 X X		Range 5		
	CH	\$3.4 17.5	5186	\$ \$	Gene	18	9
		2400	24000 6.0086				
Spermen No. Will	NO. WINTEH -6 (DUC.152)	24460	24460 0.6281				
		24500	24506 1.046				
Material 1073	7475 - T 7051 A.	25200	25200 6.043				
		25400	25400 0.0789				
BH tos Transfer	K 0	2600	26000 1.0921				
		26,400	26.400 0.1093				
Fustener	N/454.264	26.500	26.500 0.1313				
		27200	22200 6.1527				
100 W. ST.	3.0205"	27600	27600 0.1839				
		25000	28000 0.2046				
Me. Thuknoss	.3767"	25400	25400 0.2351				
		25500	25500 0.206				
Perham	F-14 C10	24200	0.3/6				
Spectrum	F-14 610	24200	24200 0.316				

28-62-1 Test parts

0.5310"

72



Notes:

*

Mas. Straw Level 40.8ksc (6008)

2,3745

29400 30000 30400

0.4281

4.4824 0.5725 1.4.987

31200 31252

30800

31252FIF Hrs

0.7541

0,7423 CENT 0.8176 0.64.56 FRANTOGRAPHIC 24400 2 4800 24924 įį 0.5432 0.1960 0.2762 1.3407 0.255 0,4232 0.5175 0.2717 0.0877 0.125 1.0254 1.0547 0.1761 0.3495 CARCA 14410 0.2176 1.1687 0.94.31 17500 51186 1.016 7 19600 19200 21200 23200 2008 00881 20802 2000 2 2 800 15600 18400 72,400 23600 10400 7200 17600 70877 20400 22000 21600 16000 173 Test pate Freemen No. WWTEH-7 (DUC 153) Mas. Straw Level 46.8 Ksi (6008) 24924FH #15 Material 1419-77881 14. ME. Thursday 0.3247" BN Low Transfer 0 7. Fostoner 12450204 100 W. J. Th. 3.6250" MWFCH Einal deack Sizes 0.7431 Fatzaro Lite Speakum Test Senes 18 AS 0. 5176"

Motes:

Kier CENER 1:4 FRATOSKADAN ₹ **₹** 0.0428 1.4507 0,1343 0.1784 6.2181 6.284 0.0905 1.0051 2.0742 0.5551 0.156 2.35 5186 6.1121 9200 13200 0000 00801 1200 2000 2800 3400 8 800 9400 0000 534 275 BN Low Trensfer D To NA54204 1415 - T7951 .37.SS." Freemen No. WINDCH-B 3,022" 1876) MWPCH Fastener ME. Thuknoss Are w.drh Test Senes 18 AS Material.

Test pate 7-26-85

0.3924"

0.9001"

Final drack Sizes



Notes:

Origin is at 0.0188 inches From the bore on the specimen surface

The second secon

Speatrum

Mas. Straw level 40.8 (50 (608)

13888 FIF ACS

Forgus Life

0,7483

36.00

APPENDIX F

FRACTOGRAPHIC RESULTS FOR SINGLE HOLE DOG-BONE SPECIMENS (Phase 2; Test Series IV(h))

₹ ₹ Rior CKAK 3/ FRAKTOBRAPHIC ¥ ¥ CAMER 0.0534 3000 0.0976 9400 0.2024 0.0318 1.0456 0.1451 B.U 806 9,1097 1.0048 5.0.397 2.0 172 2.1444 5186 9.0121 1200 71000 6800 9200 18400 0088 15400 (4000) 008 5 16 400 5200 DPEN HOLE 7479- 77951 Freemen No. WWPFD-1 [4] 77 BH Los Transfer Pot Set WWPFO MR. Thuknoss dre w.drh Material Test Senes Fastener

Test oute 6-20-85

0.8472

0.8887

12348 10.8882

21600 0.4748

22348 FIF HRS

Fatzus Lite

Final drask Sizes

20802

6.2905 6.3386 0.3906

20400

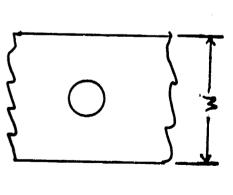
0.2392

2000

6-16 400 HR

Speatrum

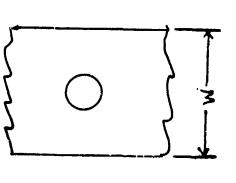




		774	CAACK	76.5	CENER	14	30
Path 161	MWPFC	463	5186	Mes.	1.30		1100
	•	36.00	0.0057	2007/	6.214		
Secure ~	Specimen No. WIMFO-2 (DX. 124)	4000	1.0084	00571	12400 0.2588		
•		4400	40124	12800	12800 0.2972		
Motorial	7475 - 77951 A.	4800	4800 5.0156	13200	13200 0.3306		
		5200	0.0193	13600	13600 0,3703		
CK Lead ?	LAN Load Transfer 0 76	SkoDo	6.023	14000	14000 0.4148		
		0000	1.0249	odh# /	1 4400 6. 4769		
Fastener	01EN HOLE	10,00	6400 0.0329	14800	14800 6.5492		
	:	10800	16 400 4.0378	15200	15200 6.4716		
100 W. S. Th.	3.0220	7200	7200 0.0436	15478	15478 6.8552		
		7000	1100 0.0 521				
Me. Thursnoss	6.3745"	8000	8000 0.0599				
	1	8400	8400 0.0689				
Speatrum	F-16 400 HE	8800	8800 0.082				
		6700	6200 6.0926				
Mar. Street	Mes. Straw Level 34,0 Ksc. (600)	94.00	9400 0.1021				
•		(0000	0.1151				
Fature Lite	Se ISUTA FIF HES	10400	10400 6.13			•	
e.		70800	10800 6.1493				
Final Post Kings	× 4 × 1 × 4 ×	11100	11200 6.1698				
-		11400	11400 00.1949				
, H7				•		•	
" " " V	Test pate	18-02-9	-85				

Testsines

Notes:



0.8552"

18 Rios CRACK 31.5 FRACTOSKAPAIC * * 0.2025 0.2325 1778 0.0859 8.1324 6.6543 0.3417 0,0365 0.1093 6.2917 1.1652 3.0055 5166 1.0192 0.4016 18800 15200 14800 15400 001581 16800 7200 17600 14400 1000 14400 1 8000 4000 3 175 Freemen No. WWF0-3 (PUT. 127) 12010-1 1019-1 DSI AL BA tod Transfer 0% Fastoner Olen Hole MWIFC Test Series IV(h) ME. Thusnoss A. W. d. Th

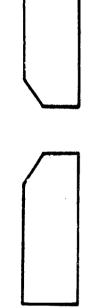
Pak 26x

19435 FIF HYS Fatyus Lite

Mes. Stress Level 34,0 KSU (Greg)

Final drack Sizes 5.41.39" 2.4317

58-02-9 Test pate



Motes:

6.4837

19200

F-16 4004R

Speaken

0.4317

FRACTOBRAPHIC SONTA

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100 Sept. 100 Se

Test Senes	14 (4)						
	The state of the s	177	CAMER	137	CEACE	7.5%	7
Pek 5et	CHAMM	489	51166	Mes.	1.00	*	1100
		15200 0.004	10000	25600	25600 0.5209		
Specials	Specimen No WIMP - 4 (DUC. 128)	15400	15100 8.0113	24000	24000 6.4634		
		10000	14000 3.0 222	24406	24406 6.7789		
Meterial	7075-77851 AL.	16400	110400 6.0319				
		1/4500	1/0800 B.042				
6. K land Tonaltee	Transfer 0 %	17200	1200 0.051				
		1 76.5	176.0 6.0648				
for the sec	See Male	18000	18000 6.0183				
		18400	18400 0.0437				
ore w.drh	3,0215"	18800	18800 0.1044				
	•	19200	19200 0.1148				
A. 7.4	6 2777 "	19600	19600 6.1337				
		20000	20000 6.1555				
500.00	1. W. W. W.	20400	20400 0.1756				

58-02-9

rest pate

@.4250"

6.7789"

Final track Sizes

0.295

244Ch FIT Hrs

Fatyus Life

20800 6.2025

21100 2100 2200 2100

0.2544

Test Seem (10/4)		` '	TAMETOS RAPAIC	S. May 3		
	727	CHACK	76.5	Gener	ž	-
MANYEO MANYEO	2	2005	Ag.	2.00	*	
	15400	15400 0.0125	24000	24000 0.3474		_
Fremes No. WINTED-51 (DUT. 129)	16000	16000 0.094	24400	24400 6.3851		_
	16400	16400 0.0291	24800	24800 6.4215		_
Notorial 1475-T7851 14.	16800	16 800 0.03	25200	25200 6.4626		_
	17200	17200 0.0478		25400 J.499		·
BA Load Transfer 0%	17600	17600 0.0598		24000 0.5416		
	18000	18000 0.0 739		26 4001.4352		
Fastener Open Hole	18400	18400 0.0861	10% 92	26 256 0.7558		
	18800	18800 6.097				_
100 W. doth 3.0215"	18200	19200 0.107				
	19400	19400 0.118				
Me. Thurson 0,3732"	2000	2000 0.1317				
•	20400	20400 0.1518				
Jestrum F-16 400 HR	20800	20800 6,1725				

Motes:

Mas. Stress Level 340 KSC (Greg)

2.1889 0.2058

21200 21600 2.2449

22400 22006

26 85% FIF Hrs

Fatyus Life

6.2477

22800

23650 0.3146

23200

6-24-85

Test pate

0.5482"

0.7558"

KK

X

Final drive Sizes

FRATOSKAPHIC MOTA

Test Senes	14:4)						
		117	CAMER	279	Cerek	ż	Charac
14 47	MWPFO	200	27.60		30,7		
		16800	16800 0.0046	25200	2520c 6.5612		
Secure 4	Serve MMPFO-6 (DUSTIBL)	17200	17200 6.0138	251,00	251,00 6.4744		
		171000	17100 1.0276	26006	24506 6.9410		
Material.	1015-TWS! AL.	18000	18000 0.043				
		18400	18500 00881				
LW last Tongler	200	18800	18800 6.0755				
	1	19200	19200 1.0904				
£	Caro Hole	19600	19600 6.1046				
		2000	20000 0.1175				
Am windsh	3.019.5	20400	20400 A.1382				
		20800	20800 6.1663				
As Thursday	" Odr. 3.760."	21200	21200 0.1809				
	l	21600	21600 6.1946				
Secure	F-16 \$60 48	22000	22000.2152				
		33.00	72.1/2. 4 7260			······································	_

Test Date 6-24-85

6.6748"

0.9410

KX

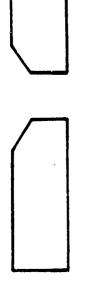
×

24400 A.4129 24800 6.4898

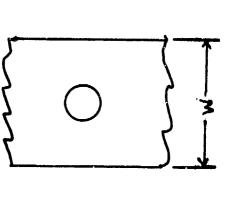
22400 0.2398

22800 0.2813

43200 4.3047 23600 4.3413 24000 0.385



Motes:



Mas. Straw level 34,6 Kst. (600)

ZhOOB FIT HRS

Fatzaro Lite

Einal drack Sizes

\$\$

CEAR

3

2.4026

6.4922

0.7724

0,4482 26800 0.6459 24800 0.3754 26400 10,5637 25400 27235 24000 25200 žį 6.0825 1.0438 1.0492 4.1213 0.1409 0.0043 20297 1850.0 21200 6,1575 9-17109 CAMCA 7200 00207 2186 0,0079 2.095 4.107 18800 20800 7600 2/400 18400 19200 2000 20402 15600 14 400 8000 1400 Ž 171 Freemen No. WWPFO-7 (D.C. 131) F-14 400 41 Notorial 1015-17851 A. ME. Thuknoss 6.3770" BA Low Transfer 0 % 100 W. drh 3.0215" Fostener Open Hole CHAMM TV (H) Speaken Test Senes Pet Set

= Mes. Street level 340 Ksc. (600g) 27235 EH Hrs

22800 10.2364

6.2164

22,400

22000 11993

23200 0. 2568

Final drask Sizes Fatzus Lite

6-24-85 Test pate

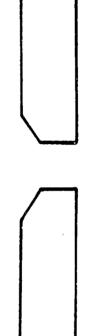
1.5465. KK

..7726" 1

2440 A.3358

24000 6.3012

23600 0.2803



FENTOSKAPHIC MATA

Total Conel	(4) 01					1		
		177	CAMEX	7.77	Cere	_	ž	3
184 AS	MWIFC	3	5/86	Me.	// B		Į	140
•		14800	14800 0.00 14	1				
Special A	JAMES NO (MINIPO - 8 (DOC. 132)	15200 0001	0.01					
		15600	15600 0.0154					
Material.	7475-77351 AL	16000	16000 1.0312					
		005111	16,400 B.044					
A. V. Land Transfer		0089/1	8650 6.0398					
		/7200	17200 6.0753					
for the same	1000 Hole	17/000	71000 A.6924					
		18000	1011 9 00081					
on white	3,0220"	00/18/	18400 0.1294					
		008/81	8561 0 08.81					
A. 71	" 3756"	19200	19200 0.1777					
		19400	19400 6.2007					
Speatra	F-110 400 HZ	20002	20000 0.2257					
	•		1 211 1 2					

6-24-85

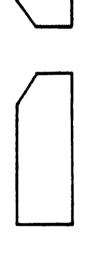
Test pate

0.7290"

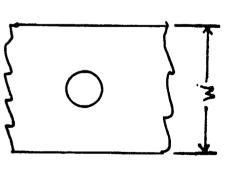
0.8193"

22400 0.4654 12806 0.8193

22000 0,4976



Motes:



ones. Street level 34,0 (so. (609)

22800 FIL HOS

Fatzus Life

Final Crack Sizes

20800 0.3104 21200 0.3588 21400 6.4278

0.2642

6.3349 6.5833 22000 0.4276 0.4853 2 2 800 6.5494 6.3085 CEAR 0.2731 23200 0.4347 13406 0.1831 FRATOSRAPMIC 2/400 22400 21200 20400 20800 3 \$ 6.0529 1.0452 9.0176 6.0925 1.1056 SABER 0.6432 0.0024 6810 6.0381 6261 1.0079 1.033 0.1201 0.0113 15200 7200 14400 16 800 12800 4000 3600 15600 6400 12400 4800 2000 3200 1600 Freemen No. WILLTO-9 (DUC. 133 7475 - T7951 100 W. ST 30195" WMIFFO BK tod Transfer Test Sones IV(h) Ac. Thuknoss Speakum Material Fastener Path 56+

0.2193

20000 0. 2399

6-24-85

Test pate

B. 5909"

0.7831"

1.2021

19400

8:18

8800

23606 FIF Hrs

Fatzono Life

Einal drack Sizes

0.1275

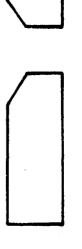
7/400

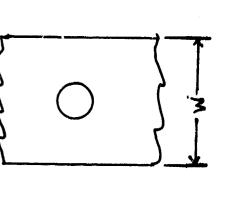
184000.1631

Notes:

Mas. Stress Level 34.065c. (Greg)

1200	6.0004 (4000 0.4468 0.0004 0.0	1200	1200 0.004 1900 0.4466 1200 0.4466 1200 0.0014 12000 0.4466 12000 0.0014 12000 0.0018 12000 0.0183 12000 0.0183 12000 0.0183 12000 0.0183 12000 0.0183 12000 0.0183 12000 0.01845	7.0 (Dur. 134) 1120 0.004 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.4446 1200 0.0134 1200 0.0134 1200 0.0134 1200 0.0143 1200 0.0143 1200 0.0143 1200 0.0143 1200 0.0143 1200 0.0143 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1200 0.1204 1204 1204 1204 1204 1204 1204 1204		3000									-																
6.0004 19.000 0.944 19.000 0.944 19.0000 0.944 19.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.000	1200	1200 0.004 1900 11200 0.0014 2000 1200 0.0183 20 435 1200 0.0183 20 435 1300 0.0183 20 435 1900 0.0183 20 435 1900 0.0183 20 435 1900 0.0193 20 435 1900 0.121 20 6 1900 0.123 20 6 1900 0.339 20 6 1900	1200 0.004 1900 1	7.1.		₹₹				1						-	_				-		-				-				
0.0016 0.0016 0.00183 0.001	11200 0.0016 11200 0.0016 12000 0.0018 12000 0.0183 12000 0.0183 13000 0.0183 14000 0.0183 14000 0.0193 15000 0.0193 16000 0.121 1800 0.1333 1800 0.329 1800 0.339 1800 0.339 1800 0.339	1200 0.0014 1200 1200 0.0014 1200 120	11200 0.0014 11200 0.0014 12000 0.00183 12000 0.0183 13100 0.0183 13100 0.0183 13100 0.0183 14800 0.01843 14800 0.1079 16800 0.1333 18000 0.1333 18000 0.3394 1800 0.3394 1800 0.3394	7.1 Cest 2.1		2,00	89770	B.5254	10797.9																						
0.0016 0.0016 0.00183 0.001	11200 0.0016 11200 0.0016 12000 0.0018 12000 0.0183 12000 0.0183 13000 0.0183 14000 0.0183 14000 0.0193 15000 0.0193 16000 0.121 1800 0.1333 1800 0.329 1800 0.339 1800 0.339 1800 0.339	13000 14000	12000 12000	6.3752 " " " " " " " " " " " " " " " " " " "		Ass.	19600	20000	20435																				ل		
1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1200 1200 1300 1300 1300 1300 1400 1600 1600 1600 1600 1600 1600 16	13000 14000	12000 12000	6.3752 " " " " " " " " " " " " " " " " " " "		,			7	6	3		b	25	9	3	000	1,	Į.	8	9	53	7/	7/2		!					
1200 1 1 200 1 200 1 1 200 1 200 1 1 200 1	1200 1200 1300 1300 1300 1300 1300 1300	15.00 15.00 15.00 15.00 15.00 15.00 16	12.000.1 13.	6.3752" 6.3752" 6.3752" 6.3752" 6.3752" 6.3752" 7.20		2815	1000	0.001			_	4	2		4,	٦,		3 3	2	7	b	9	O I '	30	'			į			
	2 to 1			0-10 (Duc 134) 0-10 (Duc 134) 10-10 (Duc 134) 0-10 (Duc 134) 10-10 (Duc 134)		37.5	11200	111000	12000	12400	12.800	/3200	14000	79551	14800	13.200	721151	1000X	(% %)	17200	1760	18001	1800	18800	1						1
20"/h) MINNTO-10 (DUS 1075-77951 1075-77951 1075-77951 10435 7517 5481 10435 7517					200	*)			100			290		W. d.7		Thicks	4	8	Street				- 1							
1000 - 10 (DOS 1000 - 10 (DOS					7.50	40		75	1	Mete	ļ	BN 602	Fastener	}	2,4		ž	8		Ž	•	Fatzuo	0	Enal	77	0.6					





FRANTOSKAPAIL

Hotes:

Mes. Stress Level 34.0 KSu. (6108)

20800 0.2043

6.256

21200

22400 0.3846 22800 6.4675

23200 0.556

7est rate 7-1-85

2.6584"

6.6979"

XX

22000 0.3433

23606 FIF Hrs

Fatzus Lite

Final drack Sizes

21600 0.2972

FRACTORRAPHIC MOTH

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Freeman No. WIMPEC-12 (Duc.13) Material 1875-77851 M. Material Transec O. Mastener appen Hole Mastener appen Hole	12.800 13.800 13.800 14.900 14.900 15.800 14.900 15.800 14.900 14.900 14.900 14.900 14.900 14.900 14.900 14.900 14.900 14.900	60032. 0,0032. 0,0008 0,0156 0,0156 0,0336	2/200 2/600 2/600 22/00 22/00 27/800 2/32/00	General 2002	¥ १	3 3
		5.0032. 5.0032. 5.0058 5.0106 7.0186 7.026		0.2829	*	78.7
		1,0032. 1,0008 5,0088 1,0186 1,0186 1,0336		0.2929		
		1,0068 5,0088 1,0166 1,0186 3,0336		28.00 6	-	
		5,0058 1,0106 1,0186 5,026 3,0336		0.30.001		
Transfer 6.		1,0106 1,016 1,026 3,0336	22 40c 22 80b 23200	0.3539		
Transec C. C. C. C. C. C. C. C. C. C. C. C. C.		1.0186 7.026 3.0336	22800	6.3949		
Transfer C. C. C. C. C. C. C. C. C. C. C. C. C.		1.026 3.0336	2.3200	A.45.86		
apen Hole		3.0336		232000.5796		
apen Hole			23600	A.4.205		
30200		6.0425		0.8523		
	14.806	1.0513				
	14800	1000				
	177.00	0.0102				
Mr. Thurson 0.3745		0.0815				
	17400	8.0919				
Speatrum F-16 400 HR	_	8,1049				
	18400	6,12				
May. Straw Level 34,0 (50 (600))	_	27517				
		8.1512				
Fathers Life 24000 Fit His	19000	8.1723			•	
	20000	1,1941				
Final Crask Sires	20400	0,2/39				
	20800	0.2436				
1-1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	70-1-6	•	•	•		
1	60,	i				
7						
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Test Serve TT'n		VI	x 25 706	CAMETOOR APAIC	Rios	
1	213	20000				
Pot Set NWIPED	230	5116		į	CERT	
	10800	10800 6.0044		19200	19200 0.4731	
Freemen No. 14MPTG-3 (DUC. 13.7)	11200	11200 0.0114		19400	19400 6.5495	
	11600	11400 6.0146		20035	20035 6.6854	
Natorial 1473-77551 AL.	12000	12000 0.025%				
	12400	12400 0.0382				
6H Los Transfer 0 %	12800	12800 6.0522				
	13.200	13200 000 648				
Fostoner Cpen Hole	13400	13600 6.0769				
	14000	14000 1.0896				
- > 0 1 V Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	11/1/02	700 1 1000				

Mas. Straw Level 34,0 ksv. (Greg) 20035 FIF Hrs Fatzus Life

8.2763

0.2412

7200

6.1944

2.3509

6.3041

18000

18400 0.4033

1-1-85

Test pare

.. 58110"

0.6854"

6.1328

15.200

4.1521

5400 16000 0000

F-16 400 41

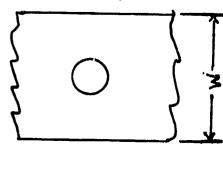
Spectrum

ME. Thuknow

Final drask Sizes

FLACTOBRADAIL MOTO

	• • • • • • • • • • • • • • • • • • • •	177	CAMER	137	Come	777	2000
3000 0.0051 \$\$00 0.0051 \$\$00 0.0051 \$\$00 0.0129 \$\$00 0.0139 \$\$00 0.0149 \$\$00 0.013 \$\$0.20 0.013 \$\$0.20 0.013 \$\$0.20 0.013 \$\$0.20 0.013 \$\$0.20 0.013 \$\$0.20 0.013 \$\$0.20 0.013 \$\$0.20 0.02 \$\$0.20 0.02 \$\$0.20 0.02 \$\$0.20 0.02 \$\$0.20 0.02 \$\$0.20 0.02 \$\$0.20 0.02 \$\$000 0.03 \$\$000 Pet Set WILLIPED	***	5186	Mes.	21.80		/105/	
4400 0.0081 8 8 8 800 0.0081 8 800 0.0081 8 800 0.0108 8 800 0.0108 8 800 0.0108 8 800 0.0108 8 800 0.0108 8 800 0.0108 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8			1,200,0		0.18/		
1015 - 77051	Freemen No. WWIFE-14 (DUC. 138)		18007	1008 011	6861.9		
7073-7751 & 4200 0.0129 4200 0.0129 1000 0.0173 1000 0.0173 1000 0.0173 1000 0.0173 1000 0.0173 1100 0.0173 1200 0.0170 1200 0.0170 1200 0.0120 1200 0.0120 1200 0.0120 1200 0.01388 12100 0.01388 15200 0.01388 15200 0.01388		8 800	0.010%	17200	6.221		
4400 6.0149 10400 0.0173 10400 0.0173 10800 0.0173 11200 0.022 11200 0.0279 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 1200 0.0548 14000 0.1204 1500 0.1388 1500 0.1388	Notorial 1815-17551 18.	4200	6.0129	17400	6.2393		
1000 0.0464 1090 0.0173 1090 0.0173 1000 0.0173 1100 0.0173 1100 0.0179 1100 0.0179 1100 0.0179 1100 0.0179 1100 0.0179 1100 0.0179 1100 0.0179 1100 0.0179 1100 0.0179 1100 0.0179		9600	8.0149	18000	6.2684		
10400 0.013 10800 0.022 11200 0.0279 11400 0.0548 12400 0.0548 12400 0.0548 12400 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 14400 0.1204 14600 0.1388 15200 0.1388 15200 0.1388		10000	49/00	18400	5.3612		
10800 0.022 11200 0.0279 11200 0.0279 11200 0.0279 1200 0.0353 1200 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 13400 0.0548 15200 0.1204 15200 0.1204 15200 0.1204 15200 0.1204 15200 0.1204		10400	2,0173	70881	9.3314		
3.6340° 3.6340° 11200 0.0353 1200 0.045 1200 0.0548 12800 0.0848 13200 0.0848 13200 0.0848 13200 0.0848 14000 0.0848 11200 0.1204 14000 0.1388 15200 0.1388 15200 0.1388		10800	6.022	19200	6.3797		
3. 6.2 40°		11200	6.0279	000151	6.4214		
1200 0.045 12400 0.045 12400 0.0548 12800 0.0445 13200 0.0445 13400 0.0832 14000 0.0673 14000 0.1204 15200 0.1204 15200 0.1388 15200 0.1388 15200 0.1204 14000 0		11600	6.0353	20000	5.4834		
6.3777" 12400 0.0548 12800 0.0465 13200 0.0548 13200 0.0542 13400 0.053 14800 0.1204 15200 0.1388 51265 14800 0.1543		12000	0.045	20400	0.5322		
12800 2,0465 13200 8,0792 13400 6,0882 14400 6,1101 14400 6,1204 51205 51205 14000 8,1388 1500 6,1388 1500 6,1388		12400	6.0548	20800	0.1457		
512C5 51		12800	3.01665	21206	0.7961		
11 340KSi (600) 21206 EITHES 51205	,	13200	2610.8				
12000 FITHES \$1200		1.3/400	2889				
	Mas. Street Level 34,0 KSU (Gress)	14000	6.0973				
21206 FITHES SIZES		14400	2.1101				٠
\$1263 EN		14810	6.1204			•	
11		15200	8,1388				
<u>. 1</u>	Einal Post Kises	15400	0.1543				
K.W.		16000	\$ 02F0				
	1						



₹ River CRIME FRANTOSRAPMIC 3 8 CAREL 128 Speines no. WWIP-0-15 (DUR. 139) Notorial 1875-77551 A. BN Los Tronsfer 0 % NA 56 204 3.0215 II (h) MWPFO Test Sevies _ 10 W. J. Th Fastener 14 44

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Specimen)							
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Test Date 7-8-85



Ly End Poublers) Notes: specimen tailed at Luy end Specimen tested without Luy

Fatzus Lite

34 KSE (66055)

FIL footh

Speetrum

.3785"

ME. Thuknow

APPENDIX G

FRACTOGRAPHIC RESULTS FOR DOUBLE REVERSED DOG-BONE SPECIMENS (Phase 2; Test Series IV(d))

			3/20 X W	M. Carrie		
Test sene: IK(d)						
	777	CHACK	76.7	CENER	بخز	CLEARE
Pot. Set WAPKING	534	5185	ME.	21.80		1100
	12800	0.0816	21208	0.8150		
Specimen No. WAFXMEH - 1 (DUC.(e))	13 200	13200 0.0887				
	13600	0.101				
Notorial 1479-17851 AL.	14000	14000 0.1116				
	14400	14400 6,1221				
Sott Load Transfer 15%	14800	14800 4,1339				
	15200	11/11/0 00251				
Lastener 20590959-08 (Hora) Rivet	15400	15400 A.1549				
	14000	14000 0.173				
Ave 4. 14 3.0115"	16400	16400 8.187				
	14,900	16,900 0.2036				
ME. Thusness . 3915"	17200	17200 6.2231				
	17600	17600 6.2476				
Spectrum F-16 400 Hr	18000	18000 4.2711				
	15.400	15:400 6.2988				
ster. Street Level 34.0850 (Gress)	18800	18800 0.3347				
	19200	19200 6.3691				
Fathur Life 21268 Ett 185	19400	19400 6.4221			•	
	2000	20000 0.4812				
tailare to internity	70400	20400 6.5585				
	20800	20800 0.682				
	•	•				

Hole Creek Final Dimensions

	Final Cra	Final Crack Size(In)
46k	Large	Small
4	0.9150"	0.7710"
1,48	6.5548	
V /	0.0835	
2.8	0,0153	

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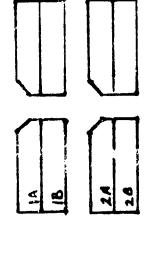
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## FRACTOSRAPHIC DOTA

			*		100 6.00		17		( <b>Emg</b> )	
14 (0)	AFXMEA	Freemen wo. MANNAGE-2 (Duc 62)	1419-T1951 AL.	BA load Treaster 150/6	NS 90359-08 (Mars) EVET	3.0065"	.3910"	F-14 400 Hr	otes. Street level 34.0456 (Gross)	28436 EI+ HES
Test Serves IK (d)	Pot Set WAFKMER	Secret No.	Material	BN 6.2 To	Fastener	or wearh	ME. Thuknoss	Speakum	Mes. Shows C	Februs Life

373	CAMCK	725	CEPER	بجز	20
~es	51166	MES.	41.80	*	7.101
008/1	10000	23200 9,2974	4.2974		
15200 0.0108	80108	123400	23400 6.3236		
15400 0.020	6,020	24,000	24000 0.3568		
16,000	11,000 0.0328	24400	24400 6.3798		
16400	16400 6.0391	24800	24800 0.4051		
008 9/	16800 8.6480 1	25200	2520 9.4335		
17200	17200 0.0568	25400	6,4563		
17600	17/000 8.0672	26000	26,000 0.4842		
(800)	18000 0.0725	2.6400	26400 0.5187		
18400	18400 0.0840	26.800	26.800 6.55/3		
0388/	18800 0.0958	27200	272006.5858		
19200 0,1083	0.1083	27600	27400 0.447		
19600	19600 6.1182	28000	28000 0,7247		
20000 0.132	8.132	28434	0.7337		
20400 8.146	8,146	•			
20800 6.145	8.145	<b>=</b> k waya <b>i</b> da			
21200	21200 0.1828				
21400	21400 6.3052				
22000	22000 6,2293				
22400 6.2553	6,2553				
228CD 2.2743	2.2743				
		•	•	-	



0.0

Hole Grack Final Dimensions

	Final Cra	Final Crack Size(In)
Hole	large	Smali
//	8.2743"	
1.8	0.8337"	0.7244"
77	"/814.0	
2.8	1 4002 1	

Nove 5:

FRACTURRAPHIC

1017						
	737	CHACK	76.5	CENER	12	200
Pot Set WAFKMER	200	5/186	MES.	1.80	1	1186
	20800 10,1475	S.1475	29200	6.352		
5 Reimon No. WARTHER -3 (DUC. 103)	21,00 8,1515	4.15715	29600			
	2/4:00 0,11605	0.1605	30000	30000 0.3888		
Material 1479-77851 AL.	22000	2200 01659	30%00	30,400 16.4088		
	22400 6.1702	6.1702	30805	30800 1.4344		
BA tood Transfer 15 %	22800 6,1712	6,1712	3/2.56	3/2.06 0.4595		
	23200 4,175	2112	31600	31600 4.4897		
Fastoner 19590359-08 (None) Rough	23600 6,1799	8.1799	32000	32000 0.5255		
	24000 01/847	0,1847	32,400	32400 0.5693		
Are 14. 5th 2,0080"	24400	24400 B.1924	12800 04.839	16831		
	24800 0.1991	0.1991	33208 b. 7580	5.7580		
Mr. Thusnoss .395"	25200	25.200 8.2095				
	25/400 0 2/58	0.2158				
Speatrum F-110 460 HR	26000 6.22.39	6.2239				
	26,400	26400 0.2338				
New Street Level 340 Ken (Greg)	210800 5.246	6.246				
	27200	27200 6.24.24				
Fathers Life 33208 FIF Hrs	27600 6,2763	6.2763				
'	78000	28000 6.2944				

Ade Grack Final Dimensions

28400 0,3/29 28800 6,3247

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727 28	CAMER . SIBE	P.E.T.	CENE	÷ ₹	CANAL
(0000)	1,008%	18400	6.2776		
00501	0,013	19800	19800 0.3046		
00801	10800 0.0203	19200	19200 3.3226		
11200	11200 0.0251	19400	19400 0.3491		
2011/	11400 0.0341	20000	2000 0.3767		
(2000)	12000 0.040	20400 6.4067	6.4067		
12400	12400 0.0498	20802	20805 8.440S		
73802	12800 0.0419	2/200	2/200 0.4798		
13200	13200 6.0767	21400 0.5185	0.5185		
13400	13400 0.0932	22000	22000 8.5478		
14000	14000 0.1024	22400 6.1046	6.1046		
0015	14400 0.1132	12836 6,7855	6.7855		
14800	14800 0.1202				
15200	15200 0.1322				
15/100	15400 0.1431				
16000	16000 0,1559				
9000	8 EZ 1 1 00h 7/1				
14 200	14800 5.1916				
17200	17200 0.2096				
7400	17600 6,2297				
18000 A 257	1100				

Fastener 20590359-08 (Nons) Esset

3.0/40"

one width

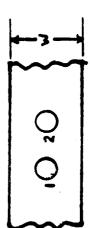
Box Low Transfer 15%

Freemen NO. WAFXMIA-4 ( DOT 44

Pot Set WASKINED

Test Senes III (d)

Notorial 1479-17851 AL.



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Notes:

18 18	2.6

Hole Crack Final Dimensions

Final Crack Size(In)			0.6984"	
Final Cra	0.1071"	0.1209"	0.7855"	" >6/1/9
16k	7/	78	7.7	2.8

Mes. Straw level 34.0 Ksi (6008)

Spectrum F-16 400 Hr

ME. Thuknoss .3915"

Fabrus Lite 22834 Fit Hrs

Failure In the

STREET, STREET, STREET, STREET,

Test Series IR (d)						
1	774	CHACK	277	GENER	ž	
Pet Set WAFXMEA	~46.5	. 5186	Mes.	1.00		
	7200	7200 6,0242	15600 0.413	0.413		
Specimen No. WAFXMEA-S(DICLES)	7600	7600 6.0324	14000 0,4427	129,00		
	8000	8000 8.0419	14400	14400 6.5191		
Material 1475-77851 AL.	2018	8400 6.0541	16800	16800 0.5978		
	2800	8800 0.0418	172.36	172.30 0.7388		
BA Load Transper 15%	9200	9200 0.6723				
!	9400	9400 8.0807				
Fastener MS 90359-08 (1600) RIMET	10000	10000 3.091				
	00101	10400 8.1035				
Are 4, 4th 3,0075"	10800	10800 0.1155				
	11200	11200 0.129				
Me. Thukasu .3895"	111,00	1/160 0.1378				
	/2000	12000 0.1574				
Speaking F-16 400 H	12400	12400 6.1691				
	12800	12800 6.1912				
May Street Level 34,0850 (600)	13200	13200 0.213				
	13600	13400 0,2405				
Fathers Life 17236 FIF Hrs	14000	14000 6.2454				
 	00/16/	14400 0.3003				
المارامية عن يما	00851	14800 0.3254				
	15200	15200 0.3753				
				•		

Able Crack Final Dimensions

	Final Crack	ch Size(In)
456	Larae	Small
//	6. 7388"	0.4226
78	0.6521"	
2.4	" cal't on	
28	6,0366"	

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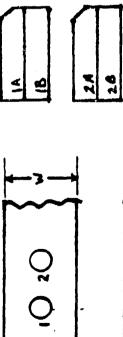
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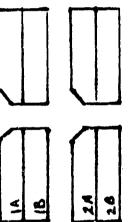
## (1979 - 7795) ## 5700 ## (2000 15 0/0 4400 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000	00 0.0396 00 0.0396 00 0.0582	-			
Los Transer 15°/2 Los Transer 15°/2 W. dth 3.0060" Thursas .3900"	0016		+	+	1
Load Transfer 15 0/h Load Transfer 15 0/h W. drh 3.0060" Thucknoss .3900"	6 6	+	+		
Los Transfer 15°/0 W. J. th. 3.0060" Thuknoss .3900" Thuknoss .3900"	_		1		
Load Transfer 15 0/2 w. d. th 3.0060" The End 3.990" The End 400 HL	t	+			
Thus noss 30060" Thus noss 3900" Friend F-16 400 HE	1060 8.0901				
w. drh 3.0060" Thuknoss 3.0060" Thuknoss 3900"	10500 0.10107				
W. drh 3.0060" Theknoss .3900"	7200 6.1212				
W. drh 3.0060" Thuknoss .3900"	7400 4.1389				
Thickness .3900"	8000 A. 1516				
Thickness .3900"	8400 0.18				
ctrum F-16 400 HK	8800 0.2102				
F-16 400 HK	9200 13.2394				
	$\overline{}$				
707					
Max. Straw Level 34,0 Ksc (Grogs) 105	-7				
	10800 8.4621				
Fathous Life 11408 FIT HIS	11200 0,5469				
1 177	8 6.9885				
tailure to mie 60					
		1	+	 	
		1			
W.			•	•	
a			Hole	Hole Grack Final	Dimensions
· ~		ì ·		Final Crack	ack Size(In)
		_	40%	Ц	144
WY		•	79	no Flaw	
87		7	18	3.6000"	
**************************************			2.4	Scupt on	-
10 20 4	Notes:		,	" - 0.00 - "	,0000

FRACTOGRAPHIC

Fastoner Ars 90359-08 (Mars) River ? Mes. Straw Level 34,0 Ksi (Grag) 19637 BLT MES Specimen No. WARKMRE-7 (Der 67) F-16 400 41 Motorial 1075-17851 CM. BN Los Transfer 15 % Pot Set workings Test Series IF (d) Falure In 16th ME. Thuxnoss Fatzono Lite dre width Speatrum

FLE	CAMCK	777	CRACK	, j	3
2	51186	Mes.	1.80	, A	2100
3200	61000	1/600	0.1369	7637	19657 0,7916
3600	0.0029	/2000	Ī		
		1840	1240 0.1609		
400	4400 B.B. 6.7	/2800	869110 00821		
4900	0.0129	(3200	0.1851		
2200	68/000 0025	13600	21619		
5600	0.0228	14000			
6000	8.0277	14400	14400 3.2253		
Getoc	0.035	14800	142.0		
6600	6,0424	15200	,		
7200	8650.0	15.600			
7600	6.059/	0009/	16000 13.2932		
8000	0.0627	16400	0.3/42		
6400	8.0777	16000	0,3333		
8800	0.0857	17300	0.3598		
9200	0.0933	17600	17600 6.3793		
7600	0.0985	/8000	18000 0,4/25		
10000	6.1613	18400	18400 0.4494		
10400	0.1106	18800	18800 0,4769		
10800	0.11.85	00261	0.5349		
11700	7618	00961			





Hole Crack Final Dimensions

	Final Cra	Final Crack Size(In)
466		Small
//	0.2707"	
87	1,6158	
7.4	0.7916"	0.6840"
28	6,8251"	

FRATOGRAPHIC DOTA

,	127. CAMES. 1866.	14800 0,0054	15200 1.0087	15400 0.0127	14000 0,0183	14400 0,0238	16800 6,0306	17200 6.6363		18000 3.0469	18400 6.0546	18800 0.0622	19200 0.0102	19400 8,0799	20000 6,0912	20400 6,5451		21200 8,1216	
During The Control of the Control of	Pate Set WATERINES	,	Freemen No. WAFKMER-8 (DIT (08)		Notorial 7479-77951 AL.		Box Load Transfer 15 %		Fastoner M590359-08 (1600) First		Are W. dth 3.0070"		ME. Thukasu ,3830"	,	Spectrum F-14 400#R		Max. Straw Level 34,0 Ksi (6mg)		

24800 19.2432

24400 0.246

25200 0.27%

6.222

24000

0,1875

23406

23200

₹ ₹

26400 8.3366

26000 8.3/27

25/100 0.290/

2/4800 8.3556 27200 6.3732 27406 3,3879

28000 3.4194

0.4537

28400

29200 0.5489

28800 D.494

29 400 6,4252 30036 0,7677

0.1497

22400 22800

22000 5.4544

21600

30036 FIF Hrs

N 80	2.6

Hole Crack Final Dimensions

	Final Cra	Final Crack Ste(In)
486	Large	Small
8	0.6487"	
1.8	1. 61.25	8.6834"
2.4	2.1457"	
2.8	8,2323"	

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	Ш
O_{2}	12
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CRACTORRAPHIC MAYER

rest Sense IV (d)		,				¥	
	124	CAMER	7.50	CENER	120	2000	
Pot Set WATERMEN	53~	2815	MEG.	1.80	/	7317	
	26.00	0.0136	12000	6.5859			
Specimen NO. WAFXMA4-9 (DIC 169)	4,000	6.0249	12400	3.7064			
	2000	0.0427	12808	0.934/			
Material 1475-T7851 AL.	4800	6.0579					
	5200	0.0743					
Box Load Transfer 15 8/0	5/6/00	4.0898					
	4000	6.1013					
Fastoner MS 90359-08 (Nora) Rivet	4,00	4.1147					
٠	68x	0.1247			-		
ore w.dr. 3.040"	72.00	de 1.37					
	7400	5.1585					
M.z. Thuknow .3880"	8000	0,1728		<u>. </u>			
	8400	0,1934					
Speakum F-16 400 HE	2800	8.2218					
	9200	6,2595	43 See				
Med. Straw Level 34,0/5; (6108)	9600	6.2845					
	00001	0.320					
Fathans Life 12808 FIT HES	10400	6.3547		+ t	·		
	00801	0.3943					
tailure to rock the	11200	6.4422					
	11400	0.515					
				•	•		
*		1	Γ				
- 3	, d			Hole	Hole Crack Final	1 DIMENSIONS	ions
- C C -			•				
			Γ	777	1.00/ 6.00	JY	J. 2c(In)
•	2.4		1	,	20 Elan	-	
	2.0		7	9,	" >00' 8		
- VI				9	01/00		;

0.9341"

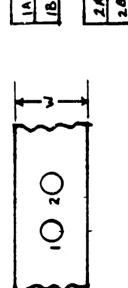
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Notes:

1 2

Test Series II (d)	(19) 11		•
		173	ž
Path 56#	WAFERMET	~25	77
		080 1,00	00.0
Secure N	NO. WINEXNIKK-10 (DUC. 70)	7200 0.01	0.01
		7600 0.02	4.0.
Motorial	7475 - T7851 AL.	8000 6.0.	0.0.
		8400 6.0	0.0
Solt Load Transfer	15 %	8800 0.00	0.00
)		9200 0.6	2.6
Fastener	215 90355-03 (10 A.) RINET	9400 6.0	6.03
		10000 0.10	0.10
som weath	3.0075"	10400 011	5.15
•		10800 0.1	0.13
ME. Thuknoss	.3%C.	11200 4.17	4.1
•		•	,

173	CAACK	**	CRACK	4	Gent
465	5/86	MES.	1180	1	2002
4800 1.0046	1,0046	15268	15208 6.8825		
7200 1	0.0113				
	1.0211				
8000 6.033	1.033				
8400	8400 0.0486				
8800	8800 0.0593				
7200 0	31200 0.6715				
1600	9400 6.0848				
10000 0.1628	87018				
10400 6,124	5,124				
0800	10800 0.1505				
170071	11200 11.1747	·			
10001	11400 0.1999				
2000 1/	12000 0.2328				
2400	12400 6.2749				
12800 6.308	5.308				
3200	13200 0.3422				
\$600 1	13600 0.3748				
14000 6.44	6,44				
14400 6.5108	8.5108				
1800	1819.0 00861				



Dimensions
Final
Crack
Hole

	1	Final Crack Size(In)
300	Large	Small
77	0.8875"	0.8107"
87	0.5568"	
7.4	wp/ 400	
28	"10108	

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Fathus Life

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Test Series II (d)						į	
; i	177	CHACK	1667	Cener	نغ	Corec	
Van Jet WATENER	3	2,66		7	8	7307	
	3000	5.00.28	14400	6.3697			
Specimen No. WAFXMA4-11(DUCZI)	3400	0.0067	14800	6.3547			
	8800	0.0126	17200				
Material 1475-77851 AL.	9200	6.021	17600	ı			
	9400	0.6279	18000	_			
BA Load Transfer 150%	10000	8.6363	18436	8.7304			
1	10400	A.6432		-			
Fastener NO 90399-08 (1400) First	10800	8.052					
	11200	2,043					
10 W. Sth 3.0120"	11400	6.0725					
	12000	0.0828					
"259E. HUKAOU . 3925"	12400	0.0968					
	12800	6.1087					
Spectrum F-16 400 H	13200	8,1219					
	13400	6,1405					
Mar. Straw Level 34,0Ksi (Gross)	12000	0.1403					
	14400	6,177					
Fathens Life 18436 FIFH	74800	6.1927					
	15,200	0.2181					
tailure to the man	151000	6.24.35					
	14000	0.2788					
					•	-	
			ſ				
~	14			•	•	•	
~~ ~~ ~	8)			Hole	Hole Grack Final Bimensions	1 Dimen	51013
)					Final Crack	1	5, 1c(In)
	:	\ <		Hole	Large		ijĮ
	77		T	-W	4. 7304"	0.6856	رو "
	20		7	8/	1.6857"		
-" ====================================				2.6	Share		
10 28 2.4	Notes:	••		7.8	ï		
				2	no taw		

FRACTORRAPHIC MOTH

14800 2,0114 15200 2,0114 15200 3,0432 11000 0,0595	1,0114 1,0274	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	CENER			2000C
1800 (5200 (5200 (5000 (5.0114 5.274	38.	30.7		₹	2100
1,800 5,000 5,000 1,000 1,000 1,000	1,01/4					
5,000	1,0274					
20001						
7 0001	,0432					
	1.0595					
7 0000	11,400 0.077/					
2 008 %	3080%					
2200 6	711.11					
7400	1455					
7 0008	18618					
7 00/18	1,2377					
1 8800	3.2345					
9200	1.3412					
19600	1.3835					
10000	3,443					
9000	58/88					
7 008 0	1.5832					
1200 /	1,7363					
1600	13.9451					
762/2	1,2976					
7000		14400 0.0111 14800 0.0906 17200 0.1455 18000 0.1455 18400 0.1454 18400 0.3317 18800 0.3412 18800 0.3412 18000 0.3412 20000 0.445 20000 0.445 20100 0.7363 21,000 0.7363	0.0906 0.1455 0.1455 0.1455 0.1457 0.2345 0.3335 0.443 0.443 0.445 0.445	6.0906 6.1455 6.1455 6.14537 6.2345 6.2345 6.3335 6.443 6.443 6.5832 6.7363	6.0906 6.1455 6.1455 6.1457 6.2345 6.2345 6.3335 6.3412 6.3335 6.3412 6.3835 7.3476	0.0906 0.1455 0.1455 0.14537 0.42372 0.43335 0.443 0.443 0.443 0.443 0.443

Dimension	
Final	
Crack	
tole	

	Final Cra	Final Crack Size(In)
tole	larae	Small
//	0.1326"	
1,8	1,1344"	
2.4	"71.521	1,05"
2.8	A 4272"	

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0.0		42	97
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18	2.4	2.8	Notes:
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(a) # C							
	273	CAACK	279	CENER	Ĺ	\vdash	3
Pote Set WARRINGS	534	2015	MEG.	1.30	`	ă,	1100
	10800 0,009	6,009					
SACIMON NO WAFKHEA-13 (DUT 73)	// 200	11200 6.0203					
	11600	6.0409					
Motorial 1479-T7851 AL.	12000	12000 0,0612					
	00821	12400 0.0912					
Both Load Transfer 15%	12800	12800 0.1219					
	13700	13200 6,1567					
Fustener No 903/3-08 (Nova) Kingt	13600	13600 0.2171					
	14000	14000 0.2743					
Ave 14, 4th 3,0100"	00/1	14400 0.3465					
	008/1	14800 0.428	,				
ME. Thursday . 3863"	15200	15200 0.5837					
,	15304	15304 0.9037					
Spectrum F-16 400 41							
ł							
Max Street (6.02) 34,0 (5) (6.02)							
Fature Life 15304 Est HES							
Failure In the 18						 	

Hole Grack Final Dimensions

	Einel (ca.	Enal (cost Sue(Fa)
110kc		Small
V /	0.7	
87	0.9037"	0.6478"
7.4	no Flaws	
28	" hondy "	

4-3-	+
~~ °°°°	

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FRACTOGRAPHIC Test Sone _ TEld)

Constant Secretary Medicates

Pok Set WARMER

WAEX 1084 - 14 (Dr. 74) Sacines No. _

Notorial 1875-77951 AL.

BN Low Transfer 15%

Fastener MS 90353-08 (1600) Einst

Are w. drh 3.0135"

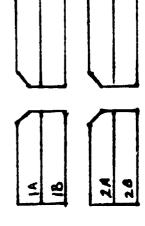
.3875" ME. Thuxasu

F.14 40048 Spectum

1-15 Mar. Struct Level 34,0164 (6128)

31636 FIT HES Failure In 16th Fargus Life

0 0.0199 0 0.0272 0 0.0272 0 0.0517 0 0.0704 0 0.0876 0 0.1288 0 0.1288 0 0.1288 0 0.1348 0 0.2083 0 0.2083 0 0.1388 0 0.2083 0 0.1388 0 0.2083 0 0.2083	727	SAMER	2 2	CEAR	¥ ₹	Gene
14800 2.0272 15200 9.04 15200 9.04 24200 9.0874 24200 9.0874 24200 9.0874 24200 0.1588 24000 0.158 24000 0.158 2400 0.158 2400 0.2083 25200 0.2473 2400 0.2473 2400 0.2484 30200 0.413/ 30200 0.413/		80101				
15200 d.m4 15400 d.m4 14000 d.osi7 14000 d.osi2 12400 d.osi2 14000 d.osi2 14000 d.osi3 14000 d.o	24/800	0.0272				
15400 60517 14200 4048 14200 4.0704 14200 4.0874 17200 4.1288 12900 4.1288 12900 6.1734 12900 6.2083 12900 6.2473 12900 6.348 12000 6.348 13000 6.4937 131436 6.88449	15200	9.04				
14000 40448 24800 4.0704 24800 9.0874 27200 9.1288 29900 9.1734 29900 9.2083 29900 9.2473 29000 6.4973 20000 6.4927 30400 6.9949	15400	0.0517				
16400 4.0704 214800 4.0874 27200 6.1082 27400 6.1288 28400 6.1734 28400 6.293 28400 6.293 28400 6.293 28400 6.293 28400 6.348 30000 6.4933 30400 6.4937	14000	87000				
21,400 6,0874 27200 6,1288 21400 6,1288 2400 6,1283 2400 0,245 2400 6,2473 2400 6,2473 25200 6,348 30400 6,413/	16400	8.0704				
27200 6.1047 21400 6.1288 18000 6.152 28400 6.1734 28400 6.2473 29400 6.2473 50000 6.2473 50000 6.4927 31436 6.884	24.900	0.0876				
11400 4,1288 18000 4,158 18900 6,1734 18900 6,12973 29400 6,1348 50000 6,1348 50000 6,4917 50800 6,4917 80800 6,4917 81436 6,8949	27200	6,1067				
19000 4.157 29400 6.1734 29700 6.2083 29200 6.2973 29000 6.348 30400 6.4131 30800 6.4931 31434 6.8949	27600	0.1288				
28400 6.1734 28200 6.2083 29200 6.2473 50000 6.348 50400 6.4937 30,200 6.5884 31200 6.5884	2 \$ 000	152				
29200 0, 2083 29200 0,247 29400 6,2473 50000 6,348 50400 6,4917 50800 6,4917 31,200 6,5884	29400	0.1736				
29200 8.25 29400 6.243 80400 6.413/ 80200 6.4927 37.200 6.8884 31434 6.8949	29800	0,2083				
24400 6,2473 50000 6,348 80400 6,493/ 80800 6,4927 312.00 6,5884	29200	0.25				
50000 6.348 50000 6.413/ 50800 6.4913/ 31.200 6.5884	29400	0,2973				
30400 6.4931 30800 6.4922 312.00 6.5884 31436 6.8949	30000	6.348				
30.200 0.4927 31.200 0.5884 314.36 0.8949	30400	6.413/				
31200 0.5884	a08 08	6.4927				
31436 2.8949	31200	4.5884			•	
	31436	6.8949				



Hole Grack Final Dimensions

	Final Cra	Final Crack Size(In)
110/6	П	Small
//	0.0442"	
1.8	0,0921"	
2.4	0. 5949"	3,5749"
7.8	1,1003,11	

ł		1	
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Q			
0	-	77	97
-		14	9
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Hole Crack Final Dimensions FLANGE SURFACES BE Kenp रे हैं NOY St. CENER COULD printer FRANTOSRAPMIC 1 5 E FRACTO GRAPHY R 110 5118 Notes: 83m 375 77 15 70359-08 (MAL) FIRST Mas. Stress Level 34,0 Ksi (Greg) 21909 FLT MES Specimen No. WAFAMES-15 (DOK. 75) 14 004 11-3 7475-T7051 AL. 6N toad Transfer 15% . 3522 " 3.0145" WARMER Ö Ö 1 1 Failure In 16th ME. ThuKnoss Folywo Life Are 14.616 Spectrum Material Festener Test Series 12 AS

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APPENDIX H

FRACTOGRAPHIC RESULTS FOR DOUBLE REVERSED DOG-BONE SPECIMENS (15% LT)

(Phase 2; Test Series IV(a))

FRATOGRAPHIC DATA

4 %

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Fe.7 Mes.

1A (B	2.6

DIMENSIONS
Final
Crack
tole

	•	Final Cra	Final Grack Size(In)
7	200	large	Small
	14	0.740"	
	18	0.0414"	
	2.4	2,040.2	".74J.J
) A	11 22 11	

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	\ 		
	1	97	
	4	ő	
-	14	97 91	

Notes:

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40.8 (Gross)

7247 ELF Hrs

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Test Pate

Failure In 164

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Par Series IV.Te)		• 1	THE WALKE	Riana 31	R I		
	173	CAMCK	KER	CENER		ž	Ľ
Pata Set WATERHA	~465	5186	MES.	1180		1	
WAPXWAA-2	17341	160092					
Specimen No. (00:17)	1100	1200 0.0141					
	7400	2400 J.0313					
Notorial 7475-77851 AL.	28.00	28CC 0,0503					
•	3200	3200 6.0716					
Both Load Transfer 15th	3000	3000 0.0445					
	4000	4000 B.12.72					
Lastoner DES 90359-08 (16 0.0) RINET	4460	2,170					
	4810	4810 6.2419					
Are 4.5th 3.00%	5200	5200 0.5356					
I	540c	5400 C.474X					
ME. Thurmass 1.39.32	5414	5616 0.85					
Speakeum I'lle 40CHE							
Mar. Street Level 46.8 Ks. (Gross)							
Fathane Life 5014 FIT HOS							

Hole Crack Final Dimensions

	Final Cra	Final Crack Size(In)
Hole		Small
77	0.2363"	0,205
18	0.3016"	d. 28.3"
1.4	16:870	1.180"
28	0.85"	

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Test pate

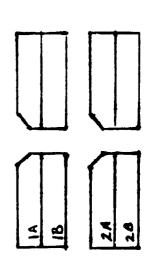
Failure In 16th

2.A 2.8 8

FRACTOGRAPMIC

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•	775	CRACK	275	CENER	124	CENT
Vola Set WAFXHAG	53~	5186	MEG.	21.80		1180
WARNING -3	4800	4800 6.051	1280	1280025088		L
Freemen No. (12:25)	5200	13.0095	8702/	17448 1.790		
	5400	2,0148				
Material 1879-17951 AL.	400	4000 0.0194				
	19.0K)	16410 divini				
Got load Trenster 154	6800	6800 0.0313				
	7200	7200 20374				
Fastoner 10590359-08 (1600) RINET	71000	71eCO 2.0011 2				
*	4000	5000 60525				
Are 14.4 5.01.40"	\$400	\$ 400 J. 016128				
;	8800	8500 1.0800				
Mr. Thuknoss 1.3910"	4200	9200 9.0915				
	940	9400 1.1143				
Jecohum F-14 400 41	Mace	10000 D.1440	•			
	10400	10400 B.1836				
Mar. stress level 40.8 Ks. (Gray)	10800	1080 A. 2211				
	11200	1120 0.2051				
Fatigue Lite 12405 FIF HIS	11600	11600 6.295				
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7,000	12000 1.3475				
	12400	12400 0.4.82				
Tout Date 5-30-06						

Pest Series IV(e)



Hole Crack Final Dimensions

	Final Cra	Final Crack Size(In)
Hole	Larae	Small
1/8	0.770 %	1,550
1,8	"1150	0,2500"
24	24 0.1117"	20800
2.8	28 Augus"	" " "

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Notes:

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Test Series II (e)						
	777	CKACK	279	CRACK	كلاز	CENE
Pot Set WAFEHER	465	5186	MES.	1180	4	2100
WAPXHAG - 4	1200	13.00.0	4523	618		
Specimen 20 (10)- 29)	1100	0.0128				
	7000	6,0203				
Notorial 1475-17051 AL.	2400	0.0329				
		0.0453				
Box Load Trensfer 15 %	.3200	3200 6.0543				
	3000	0.0743				
Fustoner ms 90359-08 (Mond) River	4000					
	dalle					
100 W. St. 30120"	7087	4900 6.1200				
	5200	5200 0.1356				
Mr. Thuse no se 0,3843"	5000	5000 0.1579				
	11000	1804				
Speatrum F.10 460 #1	1.40	0,2058				
		0,2311				
Mrs. Street Level 40,8 (Gross)	7270	6, 2703				
	7000	21.20 6.31.75				
Feb. 1.4 9333E11 His	3000	8000 4.3747				
	8400	840 0,449				
Failure In Note	5800	8800 d.549				
3 4- 6-0 5 11 5 11 5 11 5 11 5 11 5 11 5 11 5	9250	0.760				
1					•	-
		1				
*	-					
_	<u><</u>		-	•	•	•

Hole Grack Final Dimensions

		Final Crack Size(In)
Hole		Small
//	0,79 "	0,55"
78	8,130"	
7.4	0.180"	11 8/19
7.8	" The "	11 12 6

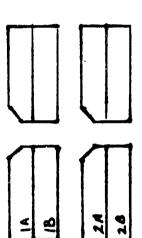
-3-	4-4	-
020	42	82
	4	91



できた。ATTECOでもより数ななどとからMED なりがののがMED にもとはWEDのようなとは、AMMOODOCもMEDA、COCKOMES だとととこの機能を含める。AMMOODOCA AMMOODOCA
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| Figure | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 | 1977 0.480 6 506 10 8:20 10943 Fastoner MS 90359-08 (40-1) FIRST Notorial 1479-17851 AL. J. 3502 BA tod Transfer 15% ore w.orh 30115" ME. Thuknoss

≤ 18 Test cate 6-3-85 O O



Hole Crack Final Dimensions

	Final Cra	Final Crack Size(In)
Hole	larae	Small
14	0.420%	0.410
97	0.246"	0,24,6"
7.4	0.410"	"35E"
78	0 "087.0	0.520

intercepts the origin on taying surtace corner count be followed once it toying surface The congin at the Grans doto relates & sigman

Notes:

1 2

4 0

9- Mas. Street Level 40.8 Ks. (600)

1-16 40CHB

Speatrum

109-43 FII 185

Failure In 16th

Fatzus Lite

FRACTOGRAPHIC MOTH

F2.F.	SANCE	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CRNCK	¥्	110
00%	0.0029				
200	0.0145				
(200)	3.0.209				
/iOU	0.03/4				
CCC	1000 11,0455				
cap	2400 6,6414			-	
300	2800 0.0786				
3	3200 A.0.354				
C,C,C	300 11.11.71				
100¢	1881 0 0004				
400	4400 0.1573				
180	1820 6,1757				
200	5200 B. 1053				
200	Seco 0.2441				
800	6000 6,2832				
400	440 dis013				
3500	Z 800 0.3333				
7200	7.200 6.30 TE				
70.00	24.Ch d.4.10				
33	800 0,4937				
801	S'18 8012				

MS 90359-08 (MAN) KIRT

Fastener

3.0110"

are w.ork

ME. Thuknoss

BN Low Transfer 150/6

1475-T7951 AL

Motorial

WAF X HA4 - 6

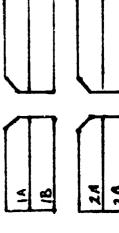
Sociates No.

WAFENHA

124 Ash

IV(e)

Test Senes



Hole Grack Final Dimensions

	Final Cra	Final Crack Size(In)
tole	Larae	Small
//	1.096"	0.000
18	0.68"0	15.50
2.4	0.220"	6,210 "
7.0	1 . 7. 1	112636

- Notes: ① Corner crack - rapid growth at early stages

H-7 Mar. Street Level 40.8Ks. (Greg)

SIUSFIL ITS

6-3-85

Test pate

Fatzua Lite Failura za Noke

F.16 400 HK

Speakam

Pate Set WATERHAS	77 X	CAACK 5/86	7. Z. Z.	CENER	₹ ₹	2186
ı	375	0,0030	12800	6.3033		
Secres 10.	7500	7500 1.0118	13200	1320: 0.3529		
	5200	5200 G.0142	13000	13400 11. 41.35		
Material 1419-17851 AL.	Suco	Suco 4.0187	14000	14000 0,4852		
	COOJI	1,000 6,0225	(1440g	14400 5.5.5		
Soll Treaster 15th	040	64.00 8.02.75	14589 0.65	500		
	16800	4800 do325				
Fustoner MS 90359-08 (Hons) River	7200	7200 0.0388				
	7400	72400 B.0459				
Ave 4. 4th 30100"	2000	3000 0.6517				
	8400	8400 6.0599				
Mr. Thursday 0,3950"	8800	880 0.0650				
	9200	9200 11.08/6				
Speatrum F.14 410.41	91000	9400 0.040				
	00001	87.01.6 0000				
May John Level 40. 3/5. (600)	CONOI	10400 B.1246				
	10800	P2 41.00 00801				
F.L 1.6 1589 FIFTHS	11200	11200 0.1481				
	11600	1400 0.1944				
Failure In Mate	12000	2.000 d. 22.06				
	1241	1240X 8, ZION				

Hole Crack Final Dimensions

	Final Cray	Final Crack Size(In)
Hole		Small
//	0.0	0.58"
1,8		
2.4	8.0.23"	0.0.0
2.8	11911 8	1130"

-3-	u
0,0	12
	4 6

FRACTOGRAPMIC

127	CANCK	7.54	CRACK	ンそ	Cent
~	5/186	MES.	11.00	*	2100
2000	1,000,0	87576 33511	8.7576		
2400	3 400 d.0010	10300 0,2455	0,2455		
250	2.820 0,0136	11.20 0.2941	17.5341		
3100	3200 1,0179	00111	1600 0,3354		
3400	34.00 11.02.30	1200 0,3714	0,3714		
den	400 6.0290	12400 0.4179	0.41.79		
4400	4400 6.0342	12800	12800 0.444		
28/	480 0.0394	13200	13200 25242		
5200	5200 B.0049	1300	3000 BUIZS		
5600	5400 00492	13649 0,83	0,8%		
0009	4000 0.0574				
00411	1700 0.0071				
008 9	6800 1.0774				
7200	7200 0.0897			,	
7400	7400 8.1028				
4000	4000 6.1146				
8400	8400 4.1341				
4800	4800 A.1556			•	
9200	9200 6.1747				
Cins	9000 6,1917				
1000	1000m 6,2139		•	-	

Fastener 10590359-08 (1600) Einst

Ave 4.5th 3.10 10"

BN Load Transfer 15 V/P

WAFKHEG-B (Ur. 83)

Freemen No.

WAFEHRA

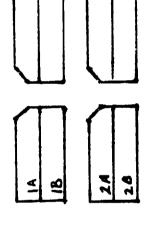
Path Set

11((e)

Test Series

7475-T7051 AL.

Material



Hole Crack Final Dimensions

		Final Crack Size(In)
40k		Small
/A	0.270"	06/160 "
78	0,158"	0.140 "
2.4	1.315"	0.252.4
2.8	" 88 N	">& 8

Notes:

F-14 400 116

Speatrum

0.34W"

ME. Thuxnoss

13449 FIF Hrs

58-9-9

Test Date

Failure In 16th Fatzus Life

Hole Crack Final Dimensions 2 Final Crack ₹ Hole 28 1:000 0.3257 2.3.2% CENER 1180 145476.43 10400 4.5.3 1000 FRACTOBRAPHIC 9400 4200 2 8 0.0239 0.0453 6.0193 1733 0.0045 2,0283 1244 11990 0.0125 たいろき 5200 10255 1.0874 CANCK 0.0391 1.230 0.0001 1.015 1.0331 1.1044 0.264 Notes: 2000 480 Sec.0. 200 ileli 2400 2800 9400 3200 77 Fastoner 10590359-08 (1600) 61859 105'47 FIF MES 0.3892" BN Load Transfer 15-1/2 WAFXHEA-9 1475-77551 100 W. d. th 3 0050" o Õ WASKHER TITE Failure In 16th 4 9 ME. ThuKnoss Fatzus Life Freemen No. Spectrum Test pate Test Senes Meterial PA 50

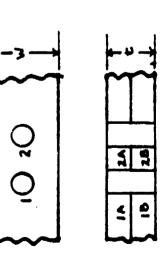
Test Sens # 12.12	Ţ					
		777	CHACK	49.4	CROCK	
Pote Set WHERITHE		~63~	5/186	Mes.	1.50	
	01-+3	377	0.6132	138	5.5	
Jane 20 (Asr. 85)	10.857	1400	18100			
•			0,0:43			
Material 1415-17851 AL.	12/ PK	3400	2400 J.C.326			
		2 \$20	4850 11,0384			
MA Loss Transfer	45	3400	3740 0,0476			
•		3400	3400 0,055.7			
For stance 155 90359-08 (10 00) Firet	(Hora) singt	100)	120 1.0040			
		COMP	1400 J.0735			
100 W. d. th 3.0.05		328 F	4800 J. 0840			
		5250	5200 0.0960			
Mr. Thursday	2,3%17"	5400	5200 6,1087			
		00001	1971.6 0000			
Speakam File	F-16 416 HR	400	1400 0,1437			
		1.82	1. 5. 1683			
What When love !	19. 47.35 (Great)	7250	7220 10 1451			
		700°	7000 A. 2365			
J	2557 FIFHE	8000	8000 0.2821			
		3400	840 6.3320			1
Failure In the	9,	3388	31110 0388			

Hole Crack Final Dimensions

9233 4.5117

Test Date

	Final Cray	Final Crack Size(In)
Hole	larae	Small
//	0.154"	
1,8	1.070 11	0.074
2.4	0,78"	1.14
28	1.888	11 86 8



FRACTOGRAPHIC MOTH

2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Test Jenes THIE						
7079 - 7779 100		£ \$	57.65	1 1 1 1 1 1 1 1 1 1	**************************************	**	13
240 0,0194 1050 0,55° 25° 25° 5,0195 10473 1,55° 25° 25° 26° 27° 25° 25° 25° 25° 25° 25° 25° 25° 25° 25		2000	0.0097	ÚGBOL	0.4332		
1800 6.0195 10973 6.590 3200 205.79 3200 205.79 4000 1.0530 9500 200.23 5500 2.0530 6900 2.120 7500 2.120 7500 2.580 8900 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580 7500 2.580		2460	46100	10%0	1,557		
3200 20.79 3200 2.0357 3200 2.0530 4400 2.0530 4500 2.0530 5500 2.0534 5500 2.1520 7500 2.1522 7500 2.1522 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1527 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1524 7500 2.1524		2850	0.0195	10473	1.590		
360. 0.0357 4000 0.0426 4000 0.0530 9500 0.053 500 0.073 500 0.053 1000 0.152 7100 0.152 8400 0.200		3200	2.02.74				
4400 6.0426 4400 8.0426 5.200 8.0423 5.200 8.0534 4000 8.0554 4500 8.1240 7.200 8.1520 8400 8.2004 2200 8.2004 2200 8.2004 4200 8.3050		300	1.0351				
4500 0 006 23 5200 0 006 23 5200 0 008 23 5200 0 0 0 33 600 0 0 12 10 7200 0 12 10	Box Load Transfer 15 %	4000	6.0426				
9500 0 0 0 23 5200 0 0 0 33 5200 0 0 554 1000 0 0 0 0 0 2100 0 0 105 2 2200 0 1200 8400 0 200 0 8500 0 200 0 8500 0 200 0 8400 0 3050 1000 0 3050		apple	0.0530				
5200 0.0334 5200 0.0334 6000 0.0533 6000 0.10533 7200 0.1300 8400 0.2007 8300 0.2007 8300 0.3050 1000 0.3050		0.25.6	0.0623				
52.00 11 0 554 1400 0,1053 1500 0,1052 2100 0,1522 4100 0,1584 2200 0,2584 2200 0,2584 11A		52ω					
1400 0.0940 4800 0.1083 4800 0.1210 7200 0.1340 8400 0.2007 8500 0.209 9200 0.259 9400 0.259 9400 0.3050		52.CÚ	11.0554				
1800 0,1083 1800 0,12,10 12,00 0,13,00 12,00 0,13,00 12,00 0,2007 12,00 0,2007 12,00 0,2007 12,00 0,3050	1	(2007)	d.0940				
1500 0.12.10 1200 0.1344 1200 0.1522 8400 6.2007 8500 6.2204 2200 0.2589 9400 0.3050 1000 0.3050			0,1083				
7260 0.1344 7400 6.1527 4400 6.2007 9500 6.2209 9200 6.2599 9400 6.3050 1000 6.3050							
7400 8, 1522 5400 6, 2007 5500 6, 2204 5200 6, 2204 5100 6, 3050 1000 6, 3050		72.60					
\$400 6.2007 \$500 6.2009 \$700 6.2209 \$700 0.2599 \$400 0.3050		7000	8,1522				
\$400 6.2007 \$200 6.2209 \$200 6.2599 \$400 6.3050 10200 6.3000	Mad. Straw Level 4.345c. (Gress)	440	1				
4500 6.2304 4200 0.3594 4000 0.3050 10002 0.3604		8400	6.2007				
4400 0.2394 4400 0.3082 10200 0.3082 11A	24 Life 10972 FIFTES	\$500	C. 2204				
6-7-85 10002 0.3050 10002 0.3604 1A 1A 1A 1A		4750	0.2599				
10 20 10 10 10 10 10 10 10 1		4400	0,3080				
		1000	A. 36.CU				
V W W W W W W W W W					•	•	-
₩ 1 18			1				
18 ×		₹	1		Mole	Gack Fina	1 Dimes
		18					.

	Einel Con	Front Const Size(Fa)
Hole	Ш	Small
7/	0.5	0.510
78	0.550"	0.540"
7.4	0.010"	
7.8	1 .000 .00	

FRACTOGRAPMIC

38

CRACK

78. F. F. F.

1.3640 0.4309

1.3117

2004 3,000. 0.454

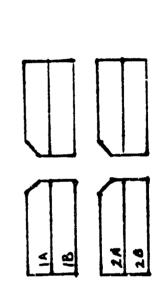
11453

6.572

10800

1040

1,2385 6.0578 1.083 0.0997 0,1313 B. 1446 6300 0.1476 1.01626 0.074 0.0800 0.1197 3.1427 10326 0.0487 0.2031 10202 4.025x 0.1104 10000 5186 5200 28CC 4400 4800 Such 800 1400 2800 3200 4000 370 700 18:50 2000 3600 2400 1000 2000 1458 FIL 1KS MS 90353-08 (N. A.s.) FIRST 40.8 Ks. (6-2) F-14 400 HK 7475 - T7951 AL. Box Load Transfer 15% 0.3153 24 30.20 WAFERHAGE H-13 Failure In 16th ME. Thuknoss Fatyus Lite Speiner No. Are w.dth Material Spectrum Test Series Fastener PAR SET



O O

3.2745

9200

58-1-9

Test parc

Hole Crack Final Dimensions

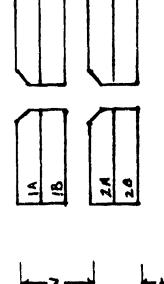
	Final Cray	Final Crack Size(In)
Hok		Small
7/	4.176"	3.152"
7,8	3,146 "	0.080
2.4	0"201	0.41"
2.8	13.15.74	0.130"

Suriace 2,016s From winer @ Inihition on taying Notes:

•

		- II						<u> </u>	<u> </u>
	(7.8%)	7		en) first		*	46	(6~9)	+ 4/53
4	WAFKHER-13 (WO. 83)	1301	15%	14) 80	3.0/20"	8.3342	F-14 400 HR	46.82% (Gmg)	12592 FIF HIS 118
IK (e)	WAFF	7475-T7951 AL.	BH Low Transfer 15%	NS 90359-08 (Mars) FIRST	3		F.) 1
•	Freimen No.		77.42		10 W. STA	AE. Thuknoss	Speakam	Max. Straw Level	Fahyus Life
Test Senes Pata Set	2	Material	37	Fastener	3	7.	ş	4	9 9

7
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6-10-85

Test aute

Notes:

7 8

4 0

Hole Crack Final Dimensions

	Einel Con	Final (cost Size(En)
Hole	larae	Small
//	0.442	0.320
8/	3.478"	2.55"
2.4	6,125	0.630"
28	1.250.0	1329.0

FRACTOSRAPAIC

1615 - 14 2000 1615 - 1715 4. 2000 1615 - 1715 4. 3200 1617 - 1715 4. 3200 1617 - 15 40 1900 1900 30135 " 1000 1000	10400 0,1476 10400 0,1476 11204 6,1427 11600 0,1435	3 8	76.7
1075 West - 14 WINTER WEST - 14 (DWG 349) 2000		!	7117
1000 2000 2400 2400 2400 2400 2500 2500 2			
7075-77951 CK. 3240 3402 790359-08 (16 m.) 6.00 30135". 5500			
7475 - 77951 AL 3200 340.00 590359 - 00 (16 m) Fine 4400 5200 30135 " 5300	7		
7475-77951 AL 3200 34402 190359-08 (1600) EMBY 4400 30135" 5200 30135" 5200	1 7		
30135" 540 30135" 5400 30135" 5400			
30135" 5 % 4020 4020 4020 4020 4020 4020 5200 5200 5200 5200 6000 6	۲		
30135" 5000 1000 1000 1000 1000 1000 1000 10	12400 0,2102		
30135" 5200 30135" 5200	125W 6.2274		
30135" 5200	13200 0,2503		
30135" 5600	0		
1000			
	14400 6,32.35	•	
Me. Thurson 0.3842	1480) 1.35.32		
45CC	15.200 0.39%		
Speatrum F-14 412 112 1200 DIOLOS	15600 0,4352		
307/2	14000 03,4349		
	10 400 0,3727		
34DC	16443 0.72		
Fatous 61 fe 16443 FIF HES 8800 6.0912			
9200			
9400 VIIIO			

Notes:

₹ 0

FRACTOGRAPMIC

₹

CROCK

1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		1 x mc 106 x m	200
Test senes Ikic)			
•	777	CABCK	7
Pot Set WATHAG	534	5186	\{
WAFXHEG-15	1600	1600 8,0149	
Freemen No. (050.92)	2000	2000 6.0205	
	2400	2400 diozsi	
Material 1475-77951 AL.	280ù	2800 0.0412	
	3200	3200 0.0591	
Box Load Transfer 15-01.	3600	3600 6,0785	
	conf	4000 8.0997	
Fastener NO 90359-08 (1600) Silvet	440	440 Juz43	
	4800	4800 0.1400	
2.00%0 3.00%0	5200	5200 0.170	
	57k.C0	54.Co 0.2115	
Mr. Thuknoss 0.3910"	(1007)	16000 6.2478	
	4400	4400 0.2904	
Speaking F-14 400 46	70%1	1400 0.3414	
н-	7200	7200 B.41.96	
91 Mes. Stree Level 40.865, (609)	2400	7400 4.49,5	
	2333.0		_

1A 8	2.6

0,0

Act Crack Final Dimensions

	First Cra	First Crack Size(In)
. 40k.	larae	Small
//	6.1036"	0.0673
4.8	" (2010	· 6511.0
2.4	0.6137"	" 375-50
7.8	13 3 4 7 10 10	*7661 3°

1 2

Notes:

5.4137

7731. 9FILMES

28-01-9

Test pate

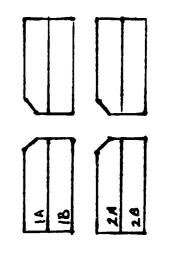
Failure In 16th Fatzus Life

APPENDIX I

FRACTOGRAPHIC RESULTS FOR DOUBLE REVERSED DOG-BONE SPECIMENS (15% LT)

(Phase 2; Test Series IV(f))

CEAUL ₹**₹** Kind CENER FRACTOGRAPMIC ¥ 5.7 1.5433 2.4539 0.7058 CAMCK 9.9087 6.8033 10283 9.2447 3703 0.9746 16793 9.1842 2,3041 9,1282 5186 28822 19828 20882 2/937 74047 15609 16664 75192 61111 18773 1072 27830 27000 727 M5 90359-08 (Mara) Kiney Freemen No. WXWPB-1 (Duc. 91) 7475-T7951 AL. Both Load Transfer 1542 3.0105" The street stilks. Benber 27830 TT (+) WXWIB Failure In 164 Me. Thuknoss Fatzus Lite Material Are w. sth Spectrum Test Lenes Fastener Pate Set



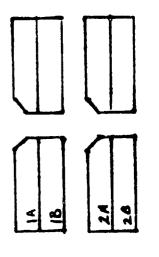
Hole Crack Final Dimensions

	Final Cra	Final Grack Size(In)
Aple	Large	Small
78	8.090€	
1.8	0.9746"	0,77.40"
24	6.1940"	
28	8.180¢"	Ì

FRACTOS RAPAIL DATA

Path Set WXWP - 2 (b.c. 2.) Freemen No. WXWP - 2 (b.c. 2.) Freemen No. WXWP - 2 (b.c. 2.) Freemen No. WXWP - 2 (b.c. 2.) Freemen No. Transfer 55%. Freemen 1879 1979 - 08 (Mrn) flast Freemen 3.0170" Freemen 3.0170" Freemen 3444 feet free Freemen 5944 feet free						5 .		4		2		
			2(00.1)	7951 CM.	15%	8 (400) EA	0/70"	1847"	mber	cksi Gm	44 FLT THE	4
	III(f)	WXWPB	WXW/B-	7479-7	·*nster	0-63806 504	e.		Be	level 3d	١	,
	TestJenes	Pate Set	Beimen W	Material	N 602 7	Fastener	ore w.drh	s. Thukns	Spectrum	A. Shrees a	Fatzus Life	

717	CAMER	¥ ¥	CENER	¥ !	3
Ž	27,62		3		
19828	6,0043				
20883	8.012h				
2/983	6.0239				
22892	0.0399				
24047	24047 0.0622				
2570/	8.0818				
	1,001.0				
	A. 13/08				
28055	1.152		-		
29/09	6,1735				
79/92	6.1976				
3/2/0	0.2233				
32273	4.2529				
34 363	34 363 0, 3227				
35437	35497 0.3783				
36 492	36 492 6. 446				
37547	37547 6.53/2				
1098€	38601 6.6515				
39444	39644 0.8173				



O O

Hole Crack Final Dimensions

	Final Cra	Final Crack Size(In)
466	Larae	Small
//	0.4487"	-
//8	0.8178"	6.6123"
2.6	8. 2866"	
28	6,1741"	

1.0

FRACTORKOPHIC DATA

SERVICE STREET, CONTRACT STREET, STREE

75.F	CANCE S/86	રેં ફે	CENE	રંફ	Chark
WITH.	8.11.45				
15609	6.6.124				
16664	0.0211				
6/1/1	0.0304				
18773	8.0 422				
19828					
20805					
21937	1.1035				
28822					
24047					
1072					
	6.2823				
17000	17000 0.3599				
25055	280556. 4519				
29109	29109 6.5493				
10/164	30164 0.7412				
0270	30470 6.8428				

N5 90359-08 (40-0) FIRST

Fastener

3.0110"

Are 14.4Th

.38%.

ME. Thuknoss

Box Load Transfer 15 0/4.

Freemen No. WKWPB-3 (DUC 93)

IZ (+)

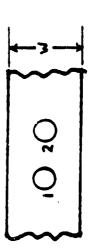
Test Jana

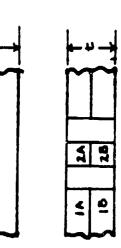
WXW/B

Pet Set

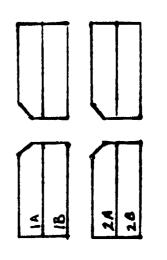
7475-T7851 AL.

Material





Notes:



Hole Grack Final Dimensions

	Final Cra	Final Crack Size(In)
46k	Large	Small
14	0.7605"	
78	8.84 28"	0.5496"
2.4	6.7017.00	
28	ne Flews	

Bember

Speetrum

304 TO FIT HICS

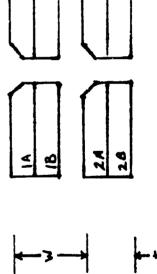
Failure In 16th

Fatzus Lite

FRACTORRAPHIC DA

TH (+)	2)(2	No. WXWP8-4 (DUC.94)	7479-T7951 AL.	15%	NS 90359-08 (40-1) FIRST	3.095"	.3886.	Bomber	34.0 Ksi (6mg)
Test Senes	Pate Set WXWIB	Freemen No. WX	Material 74.	BH Low Transfer	Fastener MS90	1 w. d. th.	Me. Thuknoss	Spectrum	2-1 Pres. Show Level

6.0057 40500 0.6752 6.00677 47.555 2.8659 6.0053 42.597 6.519 6.0244 42.597 6.519 6.02383 42.597 6.519 6.02383 42.597 6.519 6.02383 6.0576 6.02383 6.0576 6.1245 6.1245 6.1245 6.1245 6.1245 6.1245 6.1245 6.1245 6.1398 6.1398 6.1398 6.1398 6.1398	77.4	CAMCA	722	CENER	78.5	2000
0.0097 40.500 0.0097 41.555 0.00244 0.0283 0.02144 0.02383 0.0276 0.02383 0.1023 0.1023 0.1245 0.134 0.134 0.1757 0.1782 0.1782 0.1782 0.1782 0.1782 0.1783	AES.	5/86	ME.	1.20		51186
0.0097 41.555 0.0153 0.0214 0.0383 0.0218 0.0223 0.1023 0.1023 0.1742 0.1782 0.1782 0.1782 0.1782 0.1783 0.2425 0.2425 0.2425 0.2425 0.2425 0.2425 0.2425 0.2425 0.2425 0.2425 0.2425 0.2428	6773	00057	40500	0.675.2		
0.0153 0.0244 0.0383 0.0386 0.0576 0.078 0.1023 0.1245 0.1762 0.1762 0.1762 0.1762 0.1763 0.1	19.929	0.0097		2.8459		
	20883	0,0153		6.119		
		0.0244				
عدي وعدي والمستجلق بريال ورب كالمراكب المستجل المستجل المستجل المستجل المستجل المستجل المستجل المستج		0.0383				
والمراوات والمراوات والمراوات والمراوات والمراوات والمراوات والمراوات والمراوات والمراوات والمراوات		0.0576				
	25/01	8.000				
	76156	0,1023				
عدد وجده وحدد خلاله حيات در التالي التالي التالي التالي التالي التالي التالي التالي	27000	8.1245				
	28055	0.139				
	29.69	0.157				
	30.44	0,1762				
والمراوات والمراوات والمتاوات والمتاوات والمتاوات والمتاوات والمتاوات والمتاوات والمتاوات والمتاوات والمتاوات	3/3/9	0.1965				
والمراوات والمستحدد والمستحد والمستحدد	32273	0.2198				
	33328	0.2425				
عدي والتناث المساحدات	34383	0.275				
	35437	0.3018				
	36972	6.3373				
	37547	0.3795				
_	10986	0.4285				
r	33968	0.483				



0,0

42595 EIT HOS

Hole Crack Final Dimensions

	Final Cra	Final Crack Size(In)
Hole	iarae	Small
//	0,075,16"	
97	2616'9	1,6819.9
2.4	6.1157"	
2.8	A A 7U3"	-

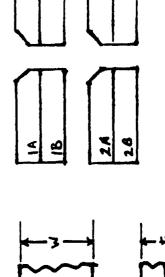
Notes:	

FRACTOSKAPNIC DOTA

CONTRACTOR OF THE PARTY OF THE

53W			29/09	31219	33328 4.	3547	37547 0
12(+) WXW78	NO. WXW78-5 (Duc. 45)	7475-T7851 AL.	Transfer 150/2	NS 90359-08 (40-1) EIRT	3.00%	.3715.	Bember
Test Jenes Nath Set	Freemen No.	Material	Box load Tran	Fastener M.	ne width	Me. Thuknoss	Speatrum

	FL! MES	CANCA. S/NE	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CENER	₹ ₹	Ser.
2570/ 10213 26156 0.0286 2700 0.0286 2900 0.0786 2900 0.0786 3.049 3.120 0.1486 3.220 0.1486 3.220 0.1486 3.220 0.1486 3.220 0.1486 3.220 0.1486 3.220 0.4095 3.220 0.4095 4.220 0.4095	26067	0.0098				
26/56 0.0286 27000 28055 0.0578 29009 0.0786 29009 0.0786 30079 0.0786 31302 31	2570/					
27:00 1.0414 2855 0.0786 2909 0.0786 25/09 0.0786 25/09 0.0786 25/29 0.1456 25/29 0.1456 25/29 0.14547 25/29 0.1043 25/29 0.4045 25/20 0.4045 26/20 0.8655						
2909 2909 2909 2007						
29/09 0,0786 34/09 0,0786 34/09 0,1456 35/09 0,1456 35/09 0,2459 35/09 0,2459 35/09 0,2459 35/09 0,4095 40,500 0,4095 40,500 0,4095 40,500 0,4095 40,500 0,4095 40,500 0,4095	28055					
32273 6.1456 32273 6.1456 3338 6.1486 34382 6.2459 35497 6.2497 35492 6.338 37549 6.4865 40695 6.4233 40698 6.9225	29/09					
372.9 6.1302 32273 6.1486 34363 6.2459 35597 6.2497 35697 6.2497 37547 0.4095 37547 0.4095 37547 0.4295 4500 6.4233 4500 6.4233	30164	9.099				
32273 0.1656 32336 0.1486 32597 0.2459 32597 0.4095 37557 0.4095 39656 0.4233 40500 0.8655 40500 0.8225	3/2/9	8.1302				
39308 0.1486 34308 0.2447 35492 0.4048 37547 0.4048 37547 0.4048 39656 0.4233 40500 0.8655 40698 0.4225	32273	0.1656				
34362 0.2459 3547 0.2647 37547 0.4095 37547 0.4095 39656 0.4233 4550 0.9225	33328	18610				
35 497 0,2947 36 49.338 37547 0,4095 39656 0,4865 40,500 0,8655 40,500 0,8655	34 363	0.2459				
37.547 6,338 37.547 0.40.95 3860/ 6.48.65 40.550 6.86.55 40.698 6.92.25	35437	2.2947				
37547 0.4095 38601 6.4865 99656 6.4233 45.50 6.8655 10698 6.9225	26478	6,338				
78601 6.4865 79656 6.4233 46.500 6.8655 70698 6.9225	37547	0,4095				
46.56 6.4.233 40.698 6.9225	10986	8,4865				
40.0098 6.9225	359626	8.6233				
	46,500	6.8655				
		6.9225				



Hole Crack Final Dimensions

	Final Cra	Final Crack Size(In)
Hole	Larae	Small
//	0.3332,0	
97	6.7005"	
7.4	0,9225"	21117"
28	014/40"	

Motes: O Larger Maw Damaged with cut at 0.3332

•

Max. Straw Level 340 KSU (GMB)

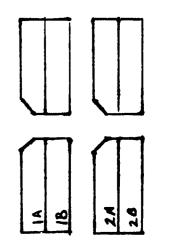
40698 FIF HCS

Failure In Note

Fatzue Life

ŀ	 MES 3/86	1800.0 10081	26156 0.0111	27000 6.0193	28655 0.0284	29,09 6.6394	30.64 0.0552	3/2/9 : 0.07/7	-	33388 8.114	34 363 6.1305	35437 0.1516	36.492 0.1774	37547 0.2173	38601 0.2455	39656 8.2993	40500 Q.3686	41555 A.5675	42595 8,1423		_
is sons	Van set WXW/8	•	Fremen No. WKWTB-6 (Der. 96)		Material 1415-77851 AL.		Box Load Transfer 15%		Fastener MS 90359-08 (16 0-1) Killet		Ave 14, 4th 30130"		ME. Thuknoss . 3917"	•	Speedrum Benber		Mas. Stress level 34.0251 (Greg)		Fathano Life 42595 FIT Hrs	tailure to more 1.4	

119	CAMCK	7.6.7	CRACK	Ŀ	ž	Cere
465	5186	MES.	1180	`	1	1186
10752	1800.0 1055					
75192	111011					
	6.0193					
	4.0284					
	6.6394					
30164	0.0552					
	10.07.7					
	4.0844					
33388	33328 8.114					
34 363	34 363 0.1305					
35437	35497 0.1516					
36.492	36 492 0.1774					
37547	37547 0.2173					
38601	0.2655					
33968	8.2993					
£0500	0.3686					
4/555	6.5675					
42595	6.1423					
		•				



Hole Crack Final Dimensions

	Final Cra	Final Grack Size(In)
Hole	Large	Small
1/4	0.1330"	
78	0.1473"	
2.4	6.7423	3.6421"
78	0.5453"	

	a- 43 -	4
\bigcap	Щ	7
	1	07
	4 9	

FRACTORRAPHIC DATA

119	CAPER		7.87	CENER	بخز	Serve
3	3186		MES.	21.80	Ś.	2000
3328	33328 0.0044		55055	6.7317		
4 383	34 383 0.0164		55617	2011		
5437	25437 0,0296					
7643	214000 26436					
1641	27647 0.049					
10986	38501 0.0677					
25966	P160. A. 0914					
40500	40500 A.1115					
5554	41555 0,1315					
12609	42609 8.1522					
1344	4344 C.1773					
4119	44719 0.2018					
\$225	9122,0 87724					
8281	4.828 0.2393					
7883	47883 0.2467					
1568	48937 0.2995					
2666	49992 1.3215					
7047	51047 1.3406					
10/2	1800 1015E					
3156	53156 0.4563					
4000	7819 00045					
		>				

Fustoner 10590359-00 (1600) First

" 3922 "

ME. Thuknow

Bomber

Speatrum

3.0140"

Are weath

BN Los Transfer 150h

Freemen No. WXWPB-7 (DUC 97)

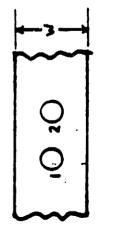
MXWPD

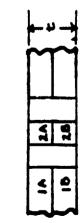
12 44

TE (+)

Test Series

Notorial 1019-17851 64.





Notes:

N.	(8	2.4

Able Crack Final Dimensions

	527 /00	Enel Cont Sure (Fe)
466	Ц	Small
77	0.1972"	
7/8	, 00 "	0.7213"
2.4	0.1757"	
7.8	" 622 "	

Mes. Street Level 34.065. (Greg)

55677 FLT HRS

Failare In 16th

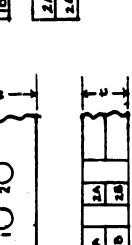
Fatzus Life

¿ į CRACK 1.95 FRACTOSRAPAIC 40784 40500 19 E 0.1976 1865.0 39656 A. 7049 CAMER 9.1586 0.2715 2.3985 1.0881 0.1056 0,1333 0.3572 0.2135 6.519 3.0147 4.0484 60583 8.2417 0.3131 0.453 0,0721 2.0214 0.0314 51186 34363 21937 28055 32273 26156 19828 30/64 31219 33328 36 492 12518 38601 20883 22992 24047 27000 18773 29109 25101 Fastener NES 90359-00 (1600) 6.00 Mas. Street 6001 34,064 (600) 40784 FET HIS FREIMON NO. WXWYB-8 (CUT 98) 7475-T7051 AL. BN Low Transfer 15% Bember 3.0110" .3855. WXWPB 100 W. ST. MR. Thuknoss Speakum Fatzus Lite Motorial Test Jeries 12 AS

DIMENSION
Final
Crack
Ask

	Final Cra	Final Crack Size(In)
466	Yacae	Small
//8	" 01″	0.7450
8/	0.2982"	
7.	no Flaws	
28	20 Fb	

-3	اد — د د	4
0.0	42	2.6
ا	4	91

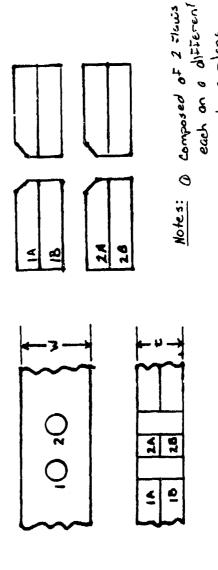


	2.0	Notes
~		-
		11

KACTOSKAPAIC POTA

NS 90359-08 (Nors) SING Freemen No. WXWTB-9 (Dr. 94) Material 1475-17851 AL. GAN Load Transfer 150/a .3922" Bember WXWIB ME. Thuknoss are w.st Test Series Spectrum Fastener Pek Set

727	CAMCK		CARRA	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	3
~465	5,186	MES.	1.80	*	1100
77/4	0.0037	5/352	1.0014		
3/2/0	6.0133				
32278	6.623				
33328	0.6379				
34 3.83					
35437					
26476					
37.547					
38601	38601 0.1525				
32965	1819				
An 100					
100	88509	,			
42609	0.2918				
43664	_				
487/9					
45773	0.4135				
46828	6.4641				
47883					
18987	, .				
2888					
5000	A. 8863				



Hole Crack Final Dimensions

Final Crack Size(In)	Small	9.7268			
Final Co	iarae	" projo'i	.18880	no Flaws	Q.
	16c	//	9/	7	1.0

tracture plane

Failure In 16th

Fatzus Lite

FRACTOGRAPHIC DATA

	171	CAMCK	725	CENER	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Cere
Pate Set WXW/8	53~	5186	MEG.	1.80	į	2180
	27000	4.00.0	16937	16937 4.4098		
FREINES NO. HXW78-10 (Dur. 100)	28055 6,0142	5,0142	4992	49972 B.4478		
	29.09 6.0236	6.0236	5/047	51007 6.494		
Material 1479-77851 AL.	30.44 0.0336	6.0336	52101	52101 0.5452		
	3/2/9	0.6467	52.56	5255 124003		
BA Low Transfer 150%		6.6599	23000	50000 6.63DS		
	33328	33328 6.0768	\$505	55055 0.8031		
Fustones MS 90359-08 (10-10) RINET	34383	3 4383 8.0901	55571	55571 6.8991		
	35437	35437 6.1055				
Ave W. doth 3.0310"	36972	36972 8,1192				
	14516	37547 6.1375				
Me. Thusness . 3847"	38601	38601 8.1546				
	33968	39656 0,1726				
Spectrum Bomber	2861.8 0050x	8.1985				
	55514	6.227				
May Three Level 340 tai (Gress)	42609	42609 A. 2472				_
	45614 11.2167	A. 2407				
Fat. 10 1. 40 SYSTI FIF HE	44779	8.2918				
	45770	6.3173				
Failure In Make 18	46828	46828 6.3492				
	47883	47883 6.3745				

DIMENSIO
Final
Crack
Hole

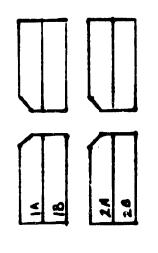
	Final Cray	Final Crack Size(In)
46k	Larae	Small
"	8.8991	4.52660
1,8	1/6/12	
2.4	1.0459"	
7.8	10000	

,	
-3-	
~~~	M
Õ	12
Q	
	4 0

Notes: ODonage at Orgin

this second dorn

		,			;		
	175	CHACK	76.5	CERE		*	Į
Pet Set WXWPB	2	. 5186	MES.	***		₹	, 5
	61181	18773 9.0179					
Freemen No. WXINFB-11 (DUC 101)	19828	19828 0.0255					
	20883	20883 0.0378					
Motorial 1875-17951 AL.	21987	21907 8.0472					
	26622	22992 6.0588					
BA los Transfer 150%	24047	24047 6.0717					
	25101	4.0819					
Castener NO 90359-00 (1600) Filest	26156	26156 6.099					
	27000	27000 0,1199					
3.0120°	23055	23055 0.1416					
	29109	29109 0.1668					
Me. Thuchoss . 3907"	30,64	30:14 0.1968					
	3/2/9	31219 6.2274					
Speatrum Broker	32273	32273 A.2734					
	33328	33328 1.3283					
Mr. Street Level 34,0Ks. (Gray)	34583	34883 8.4006					
	35437	35437 A.5005					
though Life 35745 Fur HES	36492 0,6891	0.6891				•	
	36743 0.95	0.95					
							l



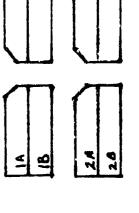
Able Creek Final Dimensions

		1 S. 10 /TC.
466	Larae	Large Small
//	0.3777	
78	0.850	0.7324
2.4	na Flaw	
28	00 Flour	

Notes:

Fastener MS 90353-08 (4000) RINET Freemen NO. WXWT6-12 (DUT.102) 7475- T7851 AL. Both Load Transfer 15 0/2 3.0100" .3885" Bember Rinxm ME. Thuknoss -Are W. STS Speatrum Material Path Ser

717	CABCK	7	CENER	*	Gere
232	5186	Mes.	11.80	<b>\$</b>	2110
19828	1.0091	#X55	6.4658		
20883	20.883 6.0/36	60924	42609 0.4482		
2/937	0.0212	4364 6.5012	6.5012		
28822	4.0343	44719	A 719 6. 5627		
24047	4.0454	45778	45778 6.4362		
10725	6.0542	46828 0.775	5.7.0		
75172	80000	47870	47870 1.0244		
27000	6.0747				
28055	0.0835				
29109	0.0984				
<b>≯</b> %4€	0.1147				
3/2/9	0.1369				
32273	0.1635				
33328	33328 1.1889				
34 303	34 303 6, 2036				
35437	35437 0.2297				
36 492	36 492 6.25.36				
37547	37547 0,2183				
1098€	0.3064				
39656	6.3377				
4000	6.3662				



Note Crack Final Dimensions

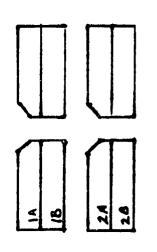
	First Cra	Final Crack Size(In)
tole	Large	Small
77	0.0624"	
1.8	1,0209 "	\$ 6169.5
7.4	8.3786"	
2.8	" 10011"	

Notes:

47870EH Hrs Fatzue Life O O

FRACTORRAPHIC

Test Sens II(f)	,		DININ YUGIN	Brown a		
	175	CAMER	74.5	Const	14	1
Vote Set WXWPB	200	51186	MG.	21.60		• .
,	61221	15.00.01	38788	6.8048		1
JACIMEN NO. WXW/8 - 13 (DUC. 103)	16773	11198				ı
	19323	4.0216				1
Material 1475-77951 AL.		0.0293				Į
	1831	0.0427				ĺ
Both Load Transfer 15%	28822	22892 0.0574				1
;	74247	24.47 4.0 705				1
Fastener MS 90359-08 (Mons) Riset	25/01	25/01 B.0.260				1
	36156	87010 95192			-	1
Are 14. 5th 3.0085	27000	27000 6.1249				ł
	2805 0.1081	1801.0				l
AE. Thuknoss . 3910"	29.09 0.1767	0.1767				1
	30.44	30 KF 6.2116				ĺ
Mestrum Bember	3/2.9	3/2.9 .6.2445				1
	32273 6.1804	5.2804				l
Med. Street level 34,0 Ksc (6mg)	33328	4. 3218				
	34383	3 4383 0.3671				i i
Fatywe Life 38798FIFHGS	35437	35437 6.4221				1
February Abres 14	36971	36972 6.4373				!
	37547	37547 A.5041				1
	38601 6.444/L	6.44941				1
						ı



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Hole Grack First Dymensions

	First Cra	First Crack Size(In)
tole		Small
//	0,9049	6.5472
78	6.3723"	
2.4	G. 1491.7	
28	2.14163	

Notes: O may be damaged at Final Fallure

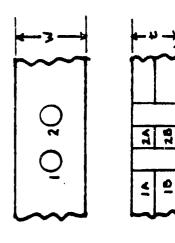
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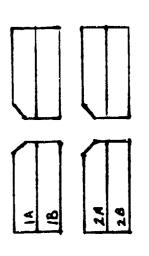
Speatrum I-14

Si series			I			
	717	CAMCK		377	CENER	7
Date Set WXW18	~~	5186		MEG.	1.30	\$
	27000	27000 8.0036		48937	48957 6.5292	
Secretary No WXWPB-14(DUC. 104)	28055	28055- 8,0148		4999z	19992 B. 5'846	
	29.69	29.09 6.6273		5/047	510+7 0.6456	
Material 7475-77951 AL.	3014	30K# 6.0416		10125	52101 6.7266	
	3129 1.056	1.056		52156	52156 8.8762	
BA Load Transfer 150%	32273 0.649	0.009		53832 1.1447	1.1447	
	33328	33328 6.0824				
Fastener MS 90359-08 (1600) RINET	34383	34383 0.0967				
	35437 6.1115	6.1115				
Ave 14. 4th 3.0105"	36972	36992 0.1245				
	37547	37547 6.1401				
ME. Thursass .3905"	38601	38601 6.1624				
•	33656	39656 6.1954				
Speetrum Bember	40500 11.2112	9.2112				
	41555	1.555 6.2333				
Max. Stress Level 34.0 KSU (Gross)	42609	42609 0.2623				
1	4364	45614 0.2868				
Fature 1. 50 53832 FIT Hrs	44779	44779 6.3149				
	45770	0.3391				
Failure In More 18	+6828 6.412	8.412				
	47082	47083 A 4624				

Test Senes Peter Set



. 1



Hole Crack Final Dimensions

Hole		Final Grack Stre(Fn)
7/	0.5	
1,8	1.1947"	0.9284"
7.4	0.36510	
28	6.1887"	

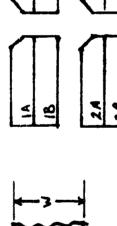
Notes: Obunge to Flan at tailure Preparation

Mes. Stree level 34,0 Ksu 1-15

Fastener ATS 90359-08 (400) 6185 Natorial 1479-77951 AL. 3.0155" Box Load Transfer 15% .3915" Bomber Freemen NO. WXWP3-15 WXWFB Me. Thuknoss Spectrum Are w. sth Test Series Pat 201

9-1-19 Street level 34,0/si (6008) 46 815 FIF HC Failure In 16th Fatzus Lite

119	CAACK	725	Ceree	130	Comme
Ş	5186	MEG.	1.80	<b>*</b>	2100
23701	0.0013	46815 6.9502	5.9522		
26156	6.0101				
27000	6.0215				
28055	6.0382				
29109	0.0551				
30164	0.073				
3/2/9	A. 0895				
32273	0.1104				
33328					
34 303					
35437	35497 0.1715				
36 492	36 492 8.1971				
37547	37547 8.2196				
1098€	1872.0				
35762	39656 0.2846				
Asso 0.32	6.32				
150V	0.3623				
60924	5.422				
436H	436H 0.4344				
4719	44719 0.5055				
£5773	t5778 6.7025				
		, b			



Hole Crack Final Dimensions

	Final Cra	Final Crack Size(In)
406	Larae	Small
77	0,4095"	
1.8	8.9502"	8.7840"
2.4	C. 4200"	
2.8	" 0181 A	

Notes:

### APPENDIX J

FRACTOGRAPHIC RESULTS FOR DOUBLE REVERSED DOG-BONE SPECIMENS (15% LT)

(Phase 2; Test Series IV(g))

Failure 2: Me 15355 Per mes  Failure 2: Me 15355 Per mes  Failure 2: Me 15355 Per mes  Failure 2: Me 15355 Per mes  Failure 2: Mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545 Per mes 1545	Max. Straw level 46.5 Ksv. (Gross)				
15.3.8.5 Rec mas  10.20  1   1h   1h   1h   1h   1h   1h   1h	May Street level 46.5 Ksv (Gross)				
15.3.8'5 encreus  10.20  1   1A   1A   1A   1A   1A   1A   1A	İ				
15.385 Rec mas  10.20  1	<b>!</b>				
10 20	15345				
	N. Comments				
O 20	10				
O 2 O	12 rate				
O 2 O					
O 2 O		+	4	_	+
O 2 O					
10 20 \ \frac{1}{2} \ \frac{18}{18} \ \frac{1}{18} \frac{1}{18} \ \frac{1}{18} \frac{1}{18} \frac{1}{18} \ \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \ \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}{18} \frac{1}					
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2A 600/ Cooch 100 100 100 100 100 100 100 100 100 10				2 Y 2 Y 2	
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	_		4	11300	9

18 CRACK FRACTOGRAPHIC 4 2 0433 1.23.36 5.00.0 1,6634 0.3445 0.4365 2.9139 1,0801 1,1237 CAMCK 5/86 2570 2.1554 3.25.56 1835 10:06 1887 6.277 17399 84.27 8289 7646 14501 18500 1830 75921 6025/ 7109 5273 7362 3/64 10911 8126 Fustoner ANS 90359-08 (1600) FIRST Mas. Street Level 40,825. (Greg) 1419-TDSI AL Bember BA Load Transfer 150/2 WABXHK4-2 17389 WASKHER Failure In 16th Me. Thuknoss Fatzus Lite Secures No. Speakan Are weath Test Sance Meteral Pet Set

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Hole Crack Fi

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Hole Crack Final Dimensions

	Final Cra	Final Crack Size(Fn)
Hole		Small
//	0.0	
18	.8116.0	
2.4	A.3139"	": 844.3
78	1 4123"	

ELICOPTE EL SANTECOO CONTRE BESSONS FINSONO CONTRESENSANTES ESPANTES ES CONTRE POSSONO CONTRE SONO CONTRE SONO EL CONTRE EL SANTECOO CONTRE BESSONS FINSONO CONTRE EN LA CONTRE ES CONTRE ES CONTRE SONO CONTRE ES CONTRE ES

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Hole Crack Final Dimensions Final Crack 25828 3 8 Hole Beer CRACK FRATOGRAPHIC 3 5 1222 .0284 CAMER 5186 1.0094 7530 3.143 1,3035 :0155 1.054 0716 141 6.191 12656 19815 10801 13500 ASST 4219 8437 16664 6328 10911 7383 2465 15609 18773 77 9 17815 FLT MES Fastoner MS 90359-08 (4000) EINST Thus. Straw level 44:8KSC (Greg) Material 1479-77951 AL. Bomber Bot Low Transfer 15% Are 10.4th 3.0155" ME. Thusnoss . 3852" O O WASKIRA 2 3 Freemen No. Failure In 164 Spectrum Fatywa Lite Test Junes 12 AS

.. 16010

Notes:

CRACK FRANTOSRAPHIC 3 8 Sugar 3,1663 2,0368 3.4842 1010: 1.0527 26/492 5.7390 1.0584 2.26/11 0,217 3.000 10547 13,346 7373 11602 5773 4328 8433 2644 4219 9492 3164 Fustaner ANS 90319-08 (1800) East - 1866. Straw Lavel 4.8 15c. (6008) 12644 FIF HIS 12010-11 1019-1751 A 3,0120" The loss Transfer 1500 .3900" WASKARA Me. Thuknoss ... Fathers Lits Failure In the Speaker dre w.drh Account No. Tersena 14 44

# Abe Greek Final Dimensions

	Final Cray	Final Crock Size(In)
406		Small
*	0.1611	
8/	0.1088	
3	0.7390"	0.5930"
2.8	13.778"	

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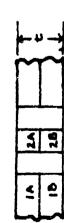
### 1.00 1		727	CABCK	76.5	CRACK	Ž	Office
2109 8164 4219 6828 7803 7803 13506 14555 15609 11601 11601 11601 11601 11601 11601 11601 11601 11601 11601	WABXHAGA				32		1101
7079 - 77951 dt. 7079 - 77951 dt. 7079 - 77951 dt. 7229 7229 7229 7229 7229 7229 7229 7229 7229 7229 7229 7229 7220 72256 722		2109	0.0043				
7079-77951 64. 5277 6528		3164	0.0687				
7079 - 77851 AL 1828 1928 1928 1929 19		4219	0.6139				
6528 1506 23.0 110 3.0 110 2.0 110 2.0 110 13.0 110 13.0 110 14.8 45. (6.0.8) 14.50 110 14.50 110 14.50 110 14.50 110 14.50 110 14.50 110 14.50 110 14.50 110 14.50 110 14.50 110 14.50 110 14.50 110 15.50 110 1	1475-T1051 AL	5273	6,023				
7203 150/6 150/6 2.010 2.010 2.010 2.010 2.3877 2.010 13500 140.8 ksi. (600) 6001 140.50Elt 1/85 15009 16001 16001		6328	6.0332				
84.87 3.5.115 -6. 6.3877 -6. 6.3877 -6. 14.8 15. (6.08) -6. 14.8 15. (6.08) -6. 14.8 15. (6.08) -6. 14.8 15. (6.08) -6. 14.8 15. (6.08) -6. 14.8 15. (6.08) -6. 14.8 15. (6.08) -6. 14.8 15. (6.08) -6. 14.8 15. (6.08) -6. 15. 16. (6.08) -6. 15. 16. (6.08) -6. 16. (6.08) -6. 16. (6.08) -6	Transfer 150%	7363	0.0455				
3.C.11C 3.C.11C 3.C.11C 2.C.11C 2.C.11C 2.C.12C 2.C.13S 77 2.C.13C 2.C.2S 77 2.C.13C 2.C.2S 77 2.C.13C 2.C.2S 77 2.C.2S 7		8427	A.L. 16 16				
3.5.115 3.5.116 13.5.56 13.5.66 13.		2992	6.0793				
3.6.116 6.3877 6.3877 14556 14556 145576 14550		10501	6.1043				
- 13877 1350c 1350c 1350c 14553 15409 14553 15409 14650 1465		10911	4.1501				
-11 C.3877 13506 14553 Tember 15409 14450 14450 14450 14450 14450		75921	6. 2053				
14555 Tember 15409 16601 16601 166000 166000 166000 166000 166000 166000 166000 166000 1		13500	6.2529				
15409 Level 45.8 ksi. (6008) fe llui 5071+ 11ks More 20		14555					
Level 45.8 ksi. (6008) Fe 144.50 Elt 118.5		15609					
		16650					
	nu Level 45.8 45. (600.31)						
1445071+ 11Rs 20							
24							
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			1				
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⊢ 3 ~~		A 6			Able	Cack Firm	+++

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	1	Final Crack Size(In)
300	rarg:	Small
1.14	0,170 "	
1,8	0.2803"	
7.8	C. 8008 "	6.6863"
28	" 4180 0	

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II(g)	WINSKIKE	e. Cher.	1419-TDSI AL.	reaster 15%	M5 90359-08 (16 A.) EIRT	3,0,05
test senes	Pek 56+	Freemen No.	Material	BA Load Transfer	Fastener	Ar W. STA

P				l
	17	- Control	-	
Ven Let WASKINGS	~465	3/86	MEG.	1
WASK HACK - 6	2109	0,0076		
Specimen No. (Der.)		0.0129		
		0.0254		
Motorial 1475-77851 AL.	5273	5273 0.6386		
	6328	6328 6.0515		
Bott Load Transfer 154.	7383	4.00.04		
	8437	4.0899		
Fastener MS 90359-08 (16 As) filest		8,1133		Ì
	10801	1041 0.1401		
Ave 4. 20 165"	109//	0.1933		
	12656	12656 8.2273		
Me. Thursnoss 0.3917	13500	0.2408		
	A535	0.3028		
Speetrum Bember	15609	0.3344		
	16664	6.3772		
wer. stress level 41.8/15, (Grog)	61111	170.0		
	18773	9.5193		
Fathur Lite 19815 FII HRS	19815	19815 0.4531		
tackers in more 16				
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Dimension.
Final
Crack
Hole

	Final Cray	Final Crack Size(In)
Hole	Larae	Small
1/4	0.1804"	
97	0.6531"	0,3496
2.4	0.5684"	
28	\$5515.0	

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Notes:

Hole Grack Final Dimensions 1100 CEPE ₹ ₹ River CRACK FRACTOGRAPHIC 7 E.T. 9,0282 8.2248 SARCK S186 6.3059 6.0457 6.0623 0.0147 4.0874 0.1232 0.0055 B. 11074 0.4411 11218 1055 10501 12443 5273 1848 2109 3/64 6328 7383 2848 4219 10911 77 ۲ 8 Fastener MS 90359-08 (400) FIRET Mes. stras level -46.8 ksi (Greg) Freemen No. (AUC. 112) 12643 FIF HRS Motorial 1875-17851 AL. 6.3927" Both Load Transfer 15% Bember Are 10. 4th 3,0080" Ó Ö WASKAKA Failure In 16th ME. Thuknoss Fathyus Life Speakum TestJenes Pet Set

16 0.2582" 14 0.2582"	Einal Crack Size(En) Large Small  0.098/ 0.2582 1.2384 0.6137"
74 1 "	

Notes:

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Ade Crack Final Dimensions 0.4987" Final Crack 3,0523" 0,5523" 180510 1,1240" ₹. HOL 28 MAN CRACK 3 FRACTOGRAPHIC * \$ 3.3856 3,5523 3.2863 CARK 3.2.337 3.1494 3.0156 0.097 1.053 5.66 Notes: 8438 4219 7383 4328 9492 10501 11589 177 7 Fastoner AS 90359-00 (No. 1) Floor - Mas. Strong Level 40,844 (6008) 11589 FIL Hrs 7475 - T7051 AL 5.3850 Mast reaster Lead Not WASKHER-B 100 W. S. M. 3.0255" Banber Ó Ő WASKIRA 1 2 Falan in the ME. Thuxnoss Spectrum = = Fatzus Lite Secures No. Test Senes Alatoral 18 AS

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Hole Crack Final Dimensions

		1 5 /Tr. )
Hole	Large	Large Small
//	68/119	
1.8	0.3591"	
2.6	0.8328"	2.7074"
28	0, 2668"	

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Notes:

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FRACTORRAPHIC MOTE

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	5273	8.00.0							
Specimen No. (Over 115)	6528	3,0227							
	7868	0.0354							
Motorial 1479-77851 AL.	8487	2.0565			<del>-  </del>				
	7656	6.1043							
Bet Load Transfer 15%	10547	6.1275							
	1/60/	3.1446							
Fastener MS 90359-08 (16 An) Rivet	12656	6.1953							
	13560	10.257							
Ave 4. drh 3.00.75"	14555	_							
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	Test Series TV(.)		FEA	F. K. AKTO & K. A. P. MIC.	Stand 7		
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1	1475-77951	6124	5.0626				
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ack Size(In)		0,7203"		
Final Crack	0.2806"	0.8241"	0.1157	no Flaw
16E	<b>*</b>	87	2.4	28

Notes: Specime, also used

tor strain Saprey (Rest Appendix K)

### APPENDIX K

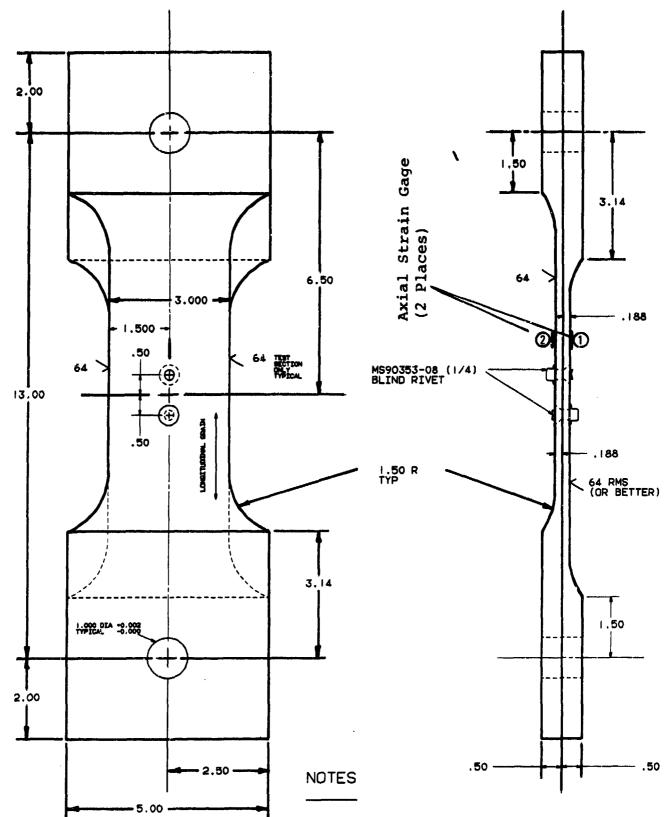
STRAIN SURVEY FOR DOUBLE REVERSED DOG BONE SPECIMEN (15% LT)

A strain survey was performed using a double-reversed dog-bone specimen. Specimen WABXHR4-15 (Dur. 120) was used for the strain survey and the survey was performed prior to fatigue testing the specimen to failure. Strain gage locations and specimen details are shown in Fig. K-1. Strain gage readings, summarized in Table K-1, are evaluated in Volume II [4].

Two additional strain surveys were performed under another program [3]. These results were based on a test specimen with the same details (Fig. K-1) and from the same material batch as the "Advanced Durability Analysis" program specimen. Since these strain survey results also apply to this program they are summarized herein.

The initial strain survey [3] was performed prior to any fatigue testing on the specimen. Initially only four strain gages were used. Strain survey results and strain gage locations are shown in Table K-2. The test specimen was then fatigue tested to 8000 flight hours using the F-16C/D Block 30G spectrum.

Following the fatigue test a follow-up strain survey was performed with two additional strain gages added. Results of the strain survey and the approximate strain gage locations are shown in Table K-3. These results from Ref. 3 are also evaluated in Volume II [4].



- 1. MATERIAL: 7475-T7351 ALUMINUM PLATE (1/2" STOCK)
- 2. MATCH DRILL HOLES USING MODIFIED WINSLOW SCHEMATIC DRILL (NO DEBURRING)
- 3. DRILL AND INSTALL MS90353-08 RIVETS PER M198

Fig. K-l Double Reversed Dog-Bone Type Specimen (15% Bolt Load Transfer) Used for Strain Survey

TABLE K-1 SUMMARY OF STRAIN SURVEY READINGS FOR DURABILITY SPECIMEN 120*

% LOAD	P _T	STRAIN RE	ADINGS (4-IN.)
	(KIPS)	<i>€</i>	€2
0	0	0	0
20	9.18	845	594
40	18.36	1656	1228
60	27.54	2434	1910
80	36.72	3174	2620
100	45.9	3968	3417
o	o	0	0
		SAME OF STREET	

^{*} WABXHR4-15 (Ref. Table 11)

TABLE K-2 STRAIN SURVEY RESULTS FOR DOUBLE-REVERSED DOG-BONE SPECIMEN WITHOUT PRIOR FATIGUE TESTING

% LOAD	P _T	STRAIN READINGS (M-IN.) (Ref. 3)					
	(KIPS)	$\epsilon_{_{_1}}$	$\epsilon_2$	<b>€</b> 3	€4		
0	o	0	0	0	0		
20	9.35	720	654	756	740		
40	18.69	1471	1343	1534	1497		
50	23.35	1847	1703	1918	1873		

# Strain Gage Locations

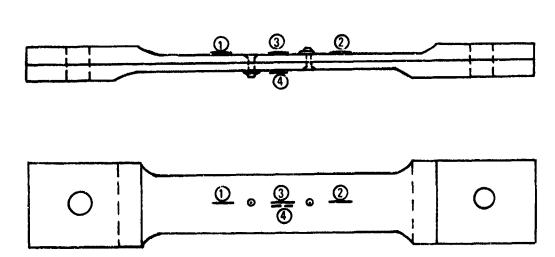
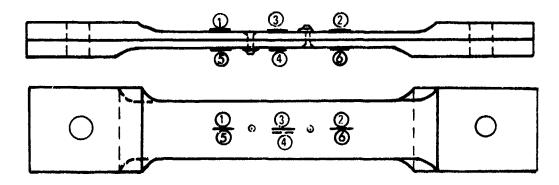


TABLE K-3 STRAIN SURVEY RESULTS FOR DOUBLE-REVERSED DOG-BONE SPECIMEN FOLLOWING 8000 FLT HOURS OF FATIGUE TESTING USING THE F-16C/D BLOCK 30G SPECTRUM

	P _T		STRAIN READINGS (#-IN.) (Ref. 3)						
[§] LOAD	(KIPS)	$\epsilon_{_1}$	€ ₂	<b>€</b> 3	<b>€</b> 4	<b>e</b> 5	<b>6</b>		
0	0	0	0	0	0	0	0		
10	4.67	630	590	635	658	665	622		
20	9.35	1252	1215	1290	1325	1332	1289		
30	14.05	1854	1830	1944	1989	1993	1954		
40	18.69	2448	2440	2592	2640	2648	2615		
50	23.35	3045	3059	3243	3292	3300	3275		
40	18.69	2430	2436	2610	2650	2646	2615		
30	14.05	1836	1825	1976	1994	1992	1953		
20	9.35	1233	1206	1327	1332	1330	1287		
10	4.67	614	587	670	669	668	621		
0	0	4	14	23	6	3	5		

## Strain Gage Locations



Notes: 1. All strain gages on & of specimen

2. After 8000 flight hours of fatigue testing one fastener hole (the one with the largest crack size) had approximately a 0.50" crack on each side of the hole.